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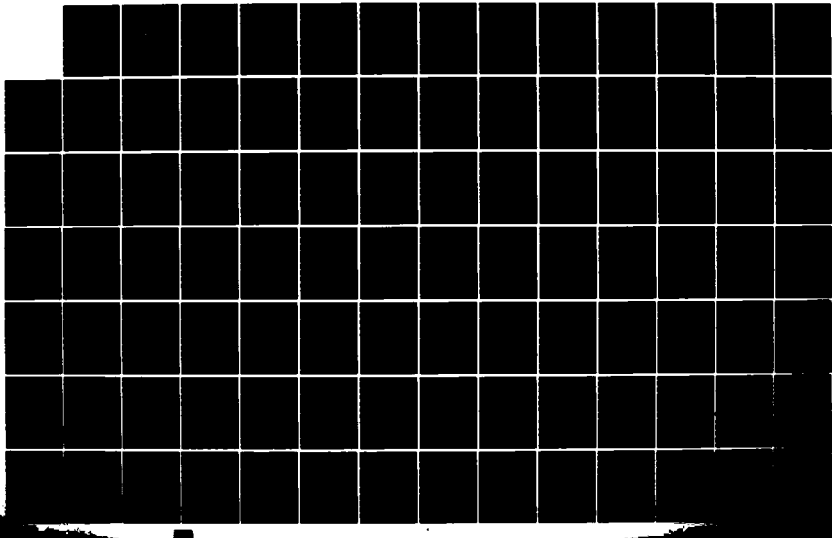

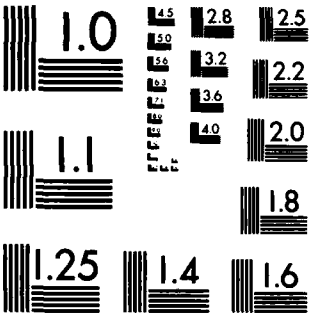

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

OMB CIRCULAR NO. A-76; EFFICIENCY REVIEW; AND PERFORMANCE MEASUREMENT OF THE DEPARTMENT OF DEFENSE HEALTH CARE DELIVERY SYSTEM

by

John A. Hetsko

and

Raymond L. Moran

June 1984

Thesis Advisor: D. R. Whipple

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Each year the Department of Defense (DOD) is exposed to great pressure from the public sector and Federal Government to save money and to be efficient. The Productivity Program Office of Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) brings together approaches for cost containment and organizational efficiency. The Military Health Services System (MHSS) has been notorious for its assumed inefficiency. This

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ABSTRACT

Each year the Department of Defense (DOD) is exposed to great pressure from the public sector and Federal Government to save money and to be efficient. The Productivity Program Office of Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) brings together approaches for cost containment and organizational efficiency. The Military Health Services System (MHSS) has been notorious for its assumed inefficiency. This apparent "waste" gets attention when health costs go up as productivity trends downward when measured by the Composite Work Unit (CWU). This thesis examines the CWU and a proposed Health Care Unit (HCU). Both measures were discussed and analyzed in an attempt to determine the reliability of each. The Commercial Activities Program and the Efficiency Review Program are presented together with some limited analysis. A proposed performance indicator is presented offering potential for productivity measurement of the MHSS. Conclusions are drawn to summarize the foregoing topics and recommendations are made regarding the Efficiency Review Program, the proposed MHSS productivity measure, and incentives are presented offering potential for efficiency improvement for military health care delivery.

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I. INTRODUCTION

A. BACKGROUND

Federal spending has become a growing public and governmental concern. This spreading apprehension regarding the long trend of increasing costs for government is not at all surprising. The GNP is expected to rise about 60 percent from $3.228 trillion in 1983 to $4.589 in 1989; but Federal spending will be higher by 62 percent for that period (from $795 billion in 1983 to $1.389 trillion in 1989). The annual Federal deficit is currently $193 billion. The total Federal debt will be about $2.318 trillion by 1987 (50.5 percent of GNP of about $4.583 trillion). Not only the growth rate of the Federal Government's cost to the public is alarming, the budget's sheer size will soon be beyond the comprehension of the average taypayer. These factors explain, at least in part, why the costs of government are less and less publically and politically tolerable [Ref. 1: A-1].

President Carter, in his 1979 State of the Union Address, made the point that "health care costs are rising one million dollars per hour, twenty four hours a day and doubling in cost every five years" [Ref. 2: p. 77]. Another example of this rapid rise for industry costs is the health care per capita cost of $1,225.00 which is expected to rise to $1,882.00 in 1985 [Ref. 3]. A statement was made at the

American Productivity Center Conference in August 1983, that the American health care system "now consumes more than ten percent of the files national product [Ref. 4]. The nation's health care industry remarkably grew during recent years of recession while other industries were declining. In 1982, while the prices for goods and services were growing at four percent, health care cost grew at a rate of twelve percent with no discernible improvement in the system's productivity.

While most of these statements concern health services obtainable in the civilian sector, the Federal Government (excluding the Department of Defense) spent $116 billion on health care in 1982, an increase of 13.1 percent over 1981 [Ref. 3: p. 22]. The Department of Defense spends billions of dollars each fiscal year to provide health care services to its active duty and retired members, and to their dependents. As in the civilian sector, these expenditures continue to increase each year (about $4 billion in 1980 to $7.1 billion in FY 1984) [Ref. 5].

It should be noted that medical services provided by the military medical departments closely approximate those provided in the civilian sector. The medical services which are provided on a day to day basis to maintain the health status of the military personnel are generally comparable with the care obtained from civilian sources for the same illnesses, although military medicine does include some services which are uniquely military in nature such as

flight medicine and undersea medicine. Additionally, there are other uniquely military problems or factors involved with providing health services such as standby requirements for maintaining facilities and vast stores of medical supplies for wartime contingencies, providing field medicine for combat situations, and maintaining other elements which are required to provide health services under wartime conditions.

B. THE DEPARTMENT OF DEFENSE PRODUCTIVITY PROGRAM

In 1973, the Federal Government expressed is first formal interest in enhancing productivity [Ref. 6]. Formal initiation of the Department of Defense Productivity Program began in 1975 with the issuance of Department of Defense Directive 5010.31, "Productivity Evaluation, Measurement and Improvement--Policies and Responsibilities" [Ref. 7]. The directive's purpose was to bring the existing Department of Defense productivity improvement programs and activities together under one Federal Government Productivity Measurement Program. This effort at program integration also included the Defense Integrated Management Engineering System (DIMES) which earlier had merged with Warehouse Gross Performance Measurement System (WGPMS).

This directive set forth important long-range Productivity Program policy statements for the Department of Defense:

1. The program will direct "...management attention on achieving maximum Defense outputs within

available resources levels by seeking out and exploiting opportunities for improved methods of operation..."

2. "Productivity measurement, enhancement, and evaluation will be an integral element of resource management."
3. The benefits of productivity enhancement "...should be re-utilized at the lowest level practical to provide an incentive for management..." to direct focus on labor cost savings efforts.

The instruction also directed management to establish productivity goals as "...an integral part of the Planning, Programming and Budgeting System as well as resources to facilitate achievement of our goals" [Ref. 7].

Department of Defense Instruction 5010.34, "Productivity Enhancement, Measurement, and Evaluation--Operating Guidelines and Reporting Instructions," set forth operational direction for the Department of Defense Productivity Program [Ref. 8]. Overall, the instruction provided for: establishment of a requirement for productivity goals at all levels; requirements of productivity measurement reporting and evaluation; and guidance on work methods, workload measurement, and productivity enhancing capital investment.

This instruction's primary objective was "to achieve optimum productivity growth...to help offset increased personnel costs, free funds for other priority requirements, and reduce the unit cost of necessary goods and services..." within the Department of Defense [Ref. 8].

Each Department of Defense agency was directed to establish annual productivity goals on every level of management via an integrated approach. Included were the requirements to: develop and use productivity indicators; accumulate productivity data; utilize productivity and performance data in manpower requirements development; and implement productivity measurement and evaluation [Ref. 8].

Given the scope of this thesis, the more important portion of DODI 5010.34 is Enclosure 3, "Productivity Measurement and Evaluation." Referencing the OMB Memorandum, "Joint Project for Measuring and Enhancing Federal Productivity," of 9 July 1973, this enclosure mandates the establishment of a permanent system for measuring and evaluating productivity for the Department of Defense under the Federal productivity reporting system for input to the Bureau of Labor and Statistics (BLS). This data was also to be used for preparation of an annual Federal Productivity Report. The responsibility for this operation was assigned to the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics). The measure value submitted was to be in the form of a productivity index: "The relationship between the volume of goods produced or services rendered and the quantity of resources consumed..." permitting period or trend data comparison of the input-output relationship of the activity, organization, agency, department, of function." Today, major function indices are used within the Department

of Defense "to determine the extent of productivity coverage in the major commands and operating agencies of DOD Components." The Enclosure noted that "A labor-productivity index is the type of productivity index most frequently developed, partly because labor is universally required in accomplishing all types of work [Ref. 8].

Section VI of Enclosure 3 defined the scope of functional measurement for the medical function: "Medical-Hospitals. This area covers personnel performing all types of medical and dental procedures and services in hospitals and medical centers." "Medical-Clinics. This area covers personnel performing all types of medical and dental procedures and services in clinics." The suggested indicators for both was the "Health Care Composite Unit," and the similar "Adjusted Admission Equivalent (USAF)." It also listed four important types of measures to be used in measuring organizational efforts:

1. Effectiveness Measures--"Comparison of current performance against pre-established mission objectives (goals)."
2. Efficiency Measures--"Comparison of current performance against either a pre-established standard or actual performance of a prior period."
3. Labor Productivity Measures--"Comparison of labor performance during two periods of time, usually a current period and a previous period, known as a base

period. It compares actual manpower expended and the resulting products produced, or services rendered during the two periods of time and discloses the labor performance of an activity or group of individuals during the current period in relation to their performance during a previous period of time."

4. Dollar Productivity Measures--"Comparison of labor performance against pre-established standards. It compares actual manpower expenses on a job or task during a given period of time with the standard established for the job or task for that period of time" [Ref. 8]

C. PRODUCTIVITY MEASUREMENT AND HEALTH CARE

As a direct result of civil and Federal concern, Congress and Federal regulatory bodies are becoming more and more interested in methods that promise cost containment and productivity improvement. Obviously, Congress, the Office of Management and Budget, and others want to be able to determine whether the level of funding is appropriate for the services provided.

Once productivity can be measured, management can apply its limited resources in a manner that best produces productivity improvement. Productivity then, is generally associated with effectiveness and efficiency: with efficiency, because this is also concerned with the ratio of outputs per unit,

i.e., a comparison of production with capital or other resources, and with effectiveness, which implies the capability to produce desired results or the capability to reach stated goals or objectives [Ref. 9: p. 71].

The simplistic equation which is generally used for productivity ratios in the available literature specifies that:

Productivity Index = Outputs/Inputs

This index, or ratio, may be computed for output per employee, employee hours, total direct labor costs, capital cost, or some other similar input. The input element of the equation is generally relatively easy to specify and obtain data for computational purposes [Ref. 15: p. 24]. The output element in some industries is similarly easy to define in total number; however this is not always the case, and is especially a problem with health services.

The most critical task encountered in designing a productivity ratio is deciding what factors the output and input elements should contain, realizing that there may not be only one "useful" answer. Thus, to design and implement a measurement system which will provide valuable insight into the efficiency of an organization requires that management decide exactly what it needs to measure. It should also be realized that productivity measurements in and of themselves do not generally provide any useful information concerning efficiency. Rather, to provide useful information, the

measures must be capable of being compared to note the differences in production over specific time periods and to be evaluated in relationship to the changes in inputs required [Ref. 11: pp. 4-5].

Productivity "improvements," as measured by changes in the computed ratios, can occur in any of the following combinations:

1. Increase output/input remains stable or constant;
2. Increase output/decrease input;
3. Increase output at a rate greater than the corresponding input element;
4. Stable or constant output/input decreases;
5. Decrease output at a lesser rate than the corresponding decreasing input element.

Obviously, productivity "declines" can occur merely by reversing the changes in each of the foregoing situations.

However, the output in the health care industry is not easily specified, and thus is a matter for debate and disagreement. The product of the health care system can generally be viewed as being in two distinct categories, that is, a process or outcome [Ref. 12: p. 50]. In viewing the product of the health care system as a process, the output becomes medical care itself. This type of measurement is the most common in use today. It uses surrogate or proxy elements to define medical care such as the number of physician visits, admissions, occupied bed days, studies performed, births,

and therapies provided. Essentially, the focus is on the collection of hospital "products," that is, the actual input which is required for the provision of health services.

Additional complications arise in viewing output as a process since hospitals produce a vast array of such "products." In theory, using activities as a measurement, one would be required to identify each distinct "product" and its associated weight in the overall output function. Thus, the aggregated output of a medical facility might be a weighted sum of the various health care services. Nevertheless, even this relatively straightforward approach has difficulty identifying each "product," applying a measure to it, and then determining an appropriate weight [Ref. 11: p. 2-1]. There are other methods for viewing hospital output as "products." Martin Feldstein has argued for using the hospital "case" as an output: the number of "cases" is measured by the number of discharges from the hospital, dead or alive. It should be noted that using Feldstein's method raises other questions. For example, what is appropriate care or input into a case? What of case-mix variations [Ref. 13: pp. 24-25]?

Marvin Mundel indicates that most hospitals report productivity in terms of cost per occupied bed day. He found it "incredible to think of a bed day as a final output; it is not what we are seeking to produce. A final output is a healed patient." He went on to qualify this "healed"

patient with such additional factors as pediatrics, geriatrics, adults, diagnosis, and whether they were treated as inpatients or outpatients [Ref. 10: p. 26].

Identifying the outcome of health care is a much more difficult task than viewing the output as a process or activity which results in health services. Outcome can be specified as the health of the patient following care, that is, a better state of health. However, "what if the patient is in worse health than before he/she entered the health care system?" Should this be deleted from the data? The literature indicates that there is no consensus on the form output should take when attempting to use outcome as the output. Daniels is of the opinion that productivity "may be how many individuals and families are maintained in a state of adaptation, relatively free of physical or psychologically discomfort." In this latter instance, the productivity index would be computed using the absence of visits to a physician if it was to his efforts in preventing illness. But even this raises the question: "how do you measure or evaluate physical or psychological discomfort, and, to what degree" [Ref. 14: p. 251]?

Donabedian discussed another aspect of defining output which he feels should be considered in the measurement system; excess, or standby capacity of the facility and personnel time. The investment in a hospital and its acquired capital investments must have some excess capacity to be

utilized when the need occurs. This same consideration must be applied to physicians, nurses, and ancillary personnel who must be ready to respond when the need for their services arises [Ref. 14: p. 247].

For example, Wolfe reported that, in evaluating a group practice, it was determined that each physician worked 42 hours per week and was assigned and stood an additional 28 hours a week standby. Thus, forty percent of the time that the physician devoted to his practice was in standby service which would not be considered in allocating output elements for productivity measurement. A problem with considering this type of "service" for allocation is the determination of whether the standby was necessitated for a legitimate reason or solely because of excess physician time [Ref. 14: p. 252].

While the foregoing discussion does not imply that productivity measurement in the health care industry is impossible, it provides insight into the difficultues in establishing a productivity measure which actually establishes what is produced by the health care industry. Thus, it is possible that no one system is "correct" or "best" for all applications in the industry. It may require that there be different systems for different applications. Therefore, each system considered for implementation should be evaluated on its merits in fulfilling its specific prime function. Currently, the Federal Government is implementing productivity

measurement for the military medical health care delivery system under the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) and its Department of Defense Productivity Program Office. The very large size of the expenditures in both the military and civilian sectors for health care services, and the very limited inputs into military appropriations, emphasize the importance of the efforts made to establish measurement systems to determine the productivity of the providers of health care for the purposes of resource allocation, budgeting, manpower allocations, and capital expenditures, both on the local level and at the higher organizational levels.

D. THESIS SCOPE AND APPROACH

The objective of this thesis is to attempt to answer the following questions: (1) does the present productivity measurement methodology in the military health care delivery system accurately reflect organizational efficiency and allow intra and inter-organizational comparisons?; (2) are direct measurements really necessary?; and (3) do we need a different measurement?

The approach is to address the above questions by considering the available output measure, the Composite Work Unit and its proposed replacement, the Health Care Unit; address the relevance and utility of the cost comparison, Efficiency Review and performance work statements methodologies of the Office of Management and Budget's Circular A-76; discuss

current Department of Defense policy, instructions, and guidelines on Efficiency Review as proposed by draft Department of Defense Instruction 5010.XX to be forthcoming in 1984 with respect to military health services; and finally, propose a productivity measure.

Chapter II will discuss the Composite Work Unit, the present measure of productivity in the military health services system. The approach is to discuss its historical background, its utilization with the Department of Defense, use for external purposes, and provide analysis of its worth as a productivity measurement of the military health services system.

In Chapter III, the proposed Health Care Unit, an index which is being designed to (possibly) replace the Composite Work Unit, will be evaluated. The discussion will focus on its design, its validity as a medical service productivity indice and trend indicator, and its relationship to Diagnostic Related Groupings, which are an integral part of the prospective payment system being utilized in some sections of the civilian and Federal health care sectors.

Chapter IV will discuss the Office of Management and Budget Circular No. A-76, and Efficiency Review. This chapter will describe the requirements of the program and provide an analysis of whether A-76 and/or Efficiency Reviews allow determinations of effective and efficient utilization of health care resources mix and related costs. Further, another productivity measurement methodology will be proposed.

Finally, Chapter V contains the conclusions reached in this study, and suggests policy changes and recommendations for present or future systems.

II. THE COMPOSITE WORK UNIT

A. HISTORICAL PERSPECTIVE

Prior to 1956, the output measure in use by all three military medical services was the "Occupied Bed Day" or "average number of beds occupied per day." This traditional surrogate measure was then used as an input element for the determination of staffing allocations based on a ratio of staffing required per 100 occupied bed days (inpatient care) and per 100 clinic outpatient visits. During the 1950's, there was increased emphasis on the provision of space available medical services to non-active duty eligible beneficiaries. Such beneficiaries, over time, were found to have shorter hospital stays than the active duty population. This meant that the turnover of patients was increasing relative to the number of occupied bed days. This fact, as well as the Department of Defense and the Bureau of the Budget's concern regarding the applicability and validity of this workload measure prompted the formation of a tri-service committee to evaluate and recommend changes to the measurement system [Ref. 15: p. 4].

Following this evaluation which included data from numerous medical service facilities, the committee recommended changes to correct the previous omission of live births and to increase the emphasis on the provision of outpatient care.

The amended system was to be simple, cost-effective, and valid over time. From this committee's efforts emerged the Composite Work Unit, still in use by the military services, Congress, and the Bureau of Labor Statistics with little modification to date [Ref. 15: p. 5].

The Composite Work Unit, or the Medical Care Composite Unit of the U.S. Army, was defined as [Ref. 15: p. 3]:

$$CWU = OBD + 10\ AD + 10\ IB + 0.30\ PV$$

where:

OBD = Occupied Bed Days. An occupied bed day is considered to be one patient per inpatient bed per day, regardless of the number of hours the patient was on the hospital census during that day. OBD is computed as the total occupied bed days per fiscal year. [Ref. 16: p. XV-1-3]

AD = Admissions. An admission is the state of one patient becoming an inpatient at a facility which provides inpatient medical care. AD is computed by total admissions for a fiscal year. [Ref. 16: p. IV-1]

LB = Live Births. This is an admission of a newborn with mother when the birth occurred at the mother's admitting facility. LB is computed by total births in a fiscal year. [Ref. 16: p. IV-1]

OPV = Outpatient Visits. An outpatient visit is the act of a patient going to an organized or specialty clinic in an outpatient status for examination, diagnosis, or medical advice. This includes inpatient clinical visits at the facility when the patient is being seen for a non-related admission problem. Included are also telephone consultations if an entry is made in the patient's chart. The classification of a visit is not dependent upon the professional level (i.e., physician, nurse, physician's assistant or hospital corpsman), but rather on

the medical care provided. OPV is the total number of outpatient visits in a fiscal year. [Ref. 17: p. 4-8]

This measure was considered an improvement on the existing "Occupied Bed Day" measurement in that it accounted for the following factors: (1) because of varying patient length of stay, one admission was determined to be equal to the same staffing requirements for 10 occupied bed days; (2) to account for newborn care requirements, it was determined that one live birth was equal to 10 patient days; and (3), ambulatory patients were utilizing an increased amount of hospital resources without an adequate quantification of staffing requirements. This latter problem could be resolved by including three outpatient visits in the measurement, essentially the same staffing required for one occupied bed day [Ref. 18: p. 2-4].

The Composite Work Unit as established in 1956 remained unchanged until 1967. At that time, it was re-evaluated in comparison with historical data. The medical departments of the U.S. Army and Navy felt that it should remain unchanged; however the Air Force changed the outpatient workload weight from .30 to .25, because the higher weight was believed to result in an over evaluation of outpatient visits in relationship to inpatient care and the amount of resources required to provide that type of medical care. This modification by the U.S. Air Force only affected the manner in which it would compute the composite work unit; the U.S. Army and Navy

would still use the .30 weight factor for the outpatient visit element of the Composite Work Unit [Ref. 19].

In 1975, the U.S. Air Force medical service would again change the method by which it would compute the product measure. This change separated the computation of services provided by hospitals and clinics, and those with and those without dental services. The new revised measure became the adjusted admission equivalent (AAE) which is calculated as follows:

$$\text{Number of AAEs} = \text{ADM} + .0150\,\text{PV} + .016\,\text{DP} + .003\,\text{LP} + .002\,\text{PR} + .004\,\text{XR}$$

where:

ADM = Total number of admissions

OPV = Total number of outpatient visits

DP = Total number of dental visits

LP = Total number of laboratory procedures

PR = Total number of pharmaceutical prescriptions

XR = Total number of x-rays processed

Hospitals without dental services exclude the dental portion of the computation. Clinic Adjusted Admission Equivalents are computed in the same manner as hospitals, both with and without dental services. The measured output is then converted into a weighted output using base year weights, and

reported by facility type (i.e., hospital or clinic, with or without dental services).

The Air Force uses the AAE as computed for internal purposes, and reports Composite Work Units as required for external purposes [Ref. 15: p. 4-5]. Exhibit I is an example of the Adjusted Admission Equivalents and related productivity indices as produced by the Defense Productivity Program Office. It should be noted that the output factor, Adjusted Admission Equivalents, does not utilize occupied bed days as a data input element, but rather relies solely on the number of admissions to account for the inpatient workload.

Exhibit I contains data which is used by the Defense Productivity Program Office and the Bureau of Labor Statistics for productivity indices for the U.S. Air Force medical services. Although the literature indicates that the U.S. Air Force uses Adjusted Admission Equivalents for internal purposes and Composite Work Units for external reporting, the indices reported by the Defense Productivity Program Office and the Bureau of Labor Statistics for the U.S. Air Force medical services actually consist of indices established with Adjusted Admission Equivalents. A more thorough explanation of this exhibit will be included with that given for Exhibits II and III as the information presented is essentially the same for all three Exhibits.

EXHIBIT I

Adjusted Admission Equivalents for U.S. Air Force Hospitals

PRODUCTIVITY AND RELATED INDEXES

(2) DEPT OF DEFENSE
(3) DEPT OF AIR FORCE
(4) MEDICAL
(6) MEDICAL SERVICES--HOSPITALS

MEASURED ACTIVITIES		1977	1978	1979	1980	1981
ADJ ADMISSION EQIV. BASE YEAR WTS. 34.13963						
DATA OUTPUT		738.028	724.128	706.356	708.002	714.570
WEIGHTED OUTPUT		25,196.000	24,721.459	24,114.730	24,170.924	24,395.175
OUTPUT INDEX	(A)	100.000	98.117	95.709	95.932	96.822
EMPLOYEE-YEARS		25,196.000	25,368.000	25,431.000	26,687.000	25,248.441
EMPLOYEE-YEAR INDEX	(B)	100.000	100.683	100.933	105.918	100.208
COMPENSATION		481,671.930	513,194.640	544,427.510	590,770.119	646,026.888
COMPENSATION INDEX	(C)	100.000	106.544	113.029	122.650	134.122
DEFLATED COMP LINKED		481,671.930	480,519.326	481,794.257	492,308,433	492,774.133
DEFL COMP INDEX	(D)	100.000	99.761	100.025	102.208	102.305
CALCULATION, INDEXES						
PRODUCTIVITY, EMPLOYEE-YEAR	(A/B)	100.000	97.451	94.824	90.572	96.621
PRODUCTIVITY, COMPENSATION	(A/C)	100.000	92.090	84.676	78.216	72.189
PRODUCTIVITY, DEFL COMP	(A/D)	100.000	98.352	95.684	93.859	94.640
COMPENSATION/EMPLOYEE-YEAR	(C/B)	100.000	105.822	111.984	115.797	133.843
UNIT LABOR COST	(C/A)	100.000	108.590	118.097	127.851	138.525
DEFL UNIT LABOR COST	(D/A)	100.000	101.676	104.510	106.543	105.663
UNIT LABOR REQUIREMENT	(B/A)	100.000	102.615	105.458	110.410	103.498

EXHIBIT I (CONTINUED)

TOTAL (MEASURED, NON-MEASURED AND SUPPORT)		1977	1978	1979	1980	1981
DATA						
WEIGHTED OUTPUT		25,196.000	24,721.459	24,114.730	24,170.924	24,395.175
OUTPUT INDEX	(A)	100.000	98.117	95.709	95.932	96.822
EMPLOYEE-YEARS		33,461.000	33,665.000	33,697.000	33,456.000	33,630.215
EMPLOYEE-YEAR INDEX	(B)	100.000	100.610	100.705	99.985	100.506
COMPENSATION		625,044.880	665,502.660	705,003.708	729,575.293	862,012.793
COMPENSATION INDEX	(C)	100.000	106.473	112.792	116.724	137.912
DEFLATED COMP LINKED		625,044.880	623,129.831	623,897.087	607,979,411	657,523.107
DEFL COMP INDEX	(D)	100.000	99.694	99.816	97.270	105.196
CALCULATION, INDEXES						
PRODUCTIVITY, EMPLOYEE-YEAR	(A/B)	100.000	97.522	95.038	95.946	96.334
PRODUCTIVITY, COMPENSATION	(A/C)	100.000	92.152	84.854	82.187	70.205
PRODUCTIVITY, DEFL COMP	(A/D)	100.000	98.418	95.885	98.624	92.039
COMPENSATION/EMPLOYEE-YEAR	(C/B)	100.000	105.828	112.003	116.741	137.218
UNIT LABOR COST	(C/A)	100.000	108.517	117.850	121.674	142.439
DEFL UNIT LABOR COST	(D/A)	100.000	101.607	104.292	101.395	108.649
UNIT LABOR REQUIREMENT	(B/A)	100.000	102.541	105.221	104.225	103.805

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Note: This exhibit will be discussed with the exhibits on the Composite Work Unit

B. USES OF THE COMPOSITE WORK UNIT

The Composite Work Unit was originally conceived as a replacement for occupied bed days as a workload indicator for allocating manpower in military medical facilities. Adopted by all of the military medical services, it was believed to provide a measure of all medical services in a single unit which would provide for fluctuation in workload and which could be used for internal management. Later, the Composite Work Unit came to be viewed not only as a staffing tool, but as an applicable measure of hospital workload. It also came into use to develop medical programs, supply and overhead cost in budgeting, and analysis between costs in different hospitals [Ref. 15: p. 3-4].

The focal point for productivity policy matters within the Department of Defense is the Department of Defense Productivity Program Office (DPPO) which manages the Defense Productivity Program. Established in 1973, DPPO evolved from the office which was involved in supporting the Warehousing Gross Performance Measurement System, one of the first systems for measuring overall functional productivity improvement and relating it to different levels of management. Presently, the DDPO is involved or responsible for policy development concerning work force motivation and other productivity enhancement efforts. They also provide management of the Productivity Investment Fund, productivity measurement in support of Department of Defense programs, research and

experiments in productivity programs and monitor Efficiency Review and management training programs [Ref. 20: p. 3-4].

Discussions with the staff at the DPPO revealed that the military services submit statistical data for workload measurement to that office. Composite Work Unit calculations, total manhours, and employee compensation are also submitted. Exhibits II and III are examples of productivity indices which are computed by that office for the medical services provided by the U.S. Army and U.S. Navy.

Exhibits I, II, and II, have indices computed for fiscal years 1977 through 1981, with 1977 being established as the base year for trend analysis. The information in the three exhibits is that which is considered "acceptable" by the Bureau of Labor Statistics. These exhibits contain those computations which were performed by the Bureau of Labor Statistics and returned to the DPPO. It should be noted that these exhibits are each divided into two sections: measured activities and total activities. The total activities section contains the measured, non-measured, and support activities required to produce the indicated output quantity.

The output of each exhibit was first converted into a weighted output with a base year weight. These weights are established for the output elements by equalizing the output to the employee-years element. Thus, the weighted output and employee-years elements in base year 1977 are equal numerically. For each succeeding year, the output number is

EXHIBIT II

Composite Work Unit for U.S. Navy Hospitals

PRODUCTIVITY AND RELATED INDEXES

(2) DEPT OF DEFENSE
(3) DEPT OF NAVY
(4) MEDICAL
(6) MEDICAL SERVICES--HOSPITALS

MEASURED ACTIVITIES		1977	1978	1979	1980	1981
COMPOSITE WORK UNIT BASE YEAR WTS. 2.53940						
DATA OUTPUT		7,330.076	6,964.018	7,477.390	7,234.722	7,326.089
WEIGHTED OUTPUT		18,614.000	17,684.432	18,988,089	18,371.858	18,375.329
OUTPUT INDEX	(A)	100.000	95.006	102.010	98.699	98.718
EMPLOYEE-YEARS		23,678.000	23,033.700	24,405.000	25,377.000	24,454.000
EMPLOYEE-YEAR INDEX	(B)	100.000	97.279	103.070	107.175	103.277
COMPENSATION		452,831.667	357,641.130	381,360.000	422,361.000	481,203.000
COMPENSATION INDEX	(C)	100.000	78.979	84.217	93.271	106.265
DEFLATED COMP LINKED		452,831.667	334,869.972	337,486.726	351,967.500	367,050.343
DEFL COMP INDEX	(C)	100.000	73.950	74.528	77.726	81.057
CALCULATION, INDEXES						
PRODUCTIVITY, EMPLOYEE-YEAR	(A/B)	100.000	97.664	98.971	92.091	95.585
PRODUCTIVITY, COMPENSATION	(A/C)	100.000	120.293	121.128	105.820	92.897
PRODUCTIVITY, DEFL COMP	(A/D)	100.000	128.473	130.874	126.984	121.789
COMPENSATION/EMPLOYEE-YEAR	(C/B)	100.000	81.188	81.708	87.027	102.893
UNIT LABOR COST	(C/A)	100.000	83.130	82.558	94.500	107.646
DEFL UNIT LABOR COST	(D/A)	100.000	77.837	73.060	78.750	82.110
UNIT LABOR REQUIREMENT	(B/A)	100.000	102.392	101.040	108.588	104.619

EXHIBIT II (CONTINUED)

TOTAL (MEASURED, NON-MEASURED AND SUPPORT)		1977	1978	1979	1980	1981
DATA						
WEIGHTED OUTPUT		18,614.000	17,684.432	18,988.089	18,371.858	18,375.329
OUTPUT INDEX	(A)	100.000	95.006	102.010	98.699	98.718
EMPLOYEE-YEARS		23,678.000	23,033.700	24,405.000	25,377.000	24,454.000
EMPLOYEE-YEARS INDEX	(B)	100.000	97.279	103.070	107.175	103.277
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COMPENSATION INDEX	(C)	100.000	78.979	84.217	93.271	106.265
DEFLATED COMP LINKED		452,831.667	334,869.972	337,486.726	351,967.500	367,050.343
DEFL COMP INDEX	(D)	100.000	73.950	74.528	77.726	81.057
CALCULATION, INDEXES						
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PRODUCTIVITY, COMPENSATION	(A/C)	100.000	120.293	121.128	105.820	92.897
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DEFL UNIT LABOR COST	(D/A)	100.000	77.837	73.060	78.750	82.110
UNIT LABOR REQUIREMENT	(B/A)	100.000	102.392	101.040	108.588	104.619

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EXHIBIT III

Health Care Composite Units for U.S. Army Hospitals

PRODUCTIVITY AND RELATED INDEXES

(2) DEPT OF DEFENSE
(3) DEPT OF ARMY
(4) MEDICAL
(6) MEDICAL SERVICES--HOSPITALS

MEASURED ACTIVITIES		1977	1978	1979	1980	1981
HEALTH CARE COMP UNITS BASE YEAR WTS. 1157.000						
DATA OUTPUT		43.000	42.200	44.300	48.000	48.700
WEIGHTED OUTPUT		49,751.000	48,825.400	51,255.100	55,536.000	56,345,900
OUTPUT INDEX	(A)	100.000	98.140	103.023	111.628	113.256
EMPLOYEE-YEARS		49,751.000	49,306.000	48,318.000	48,800.000	51,400.000
EMPLOYEE-YEAR INDEX	(B)	100.000	99.106	99.130	98.088	103.315
COMPENSATION		665,986.000	704,422.000	743,278.000	811,600.000	956,381.000
COMPENSATION INDEX	(C)	100.000	105.771	111.606	121.864	143.604
DEFLATED COMP LINKED		665,986.000	659,571.161	657,768.142	676,333.333	729,504.958
DEFL COMP INDEX	(D)	100.000	99.037	98.766	101.554	109.538
CALCULATION, INDEXES						
PRODUCTIVITY, EMPLOYEE-YEAR	(A/B)	100.000	99.025	103.928	113.803	109.622
PRODUCTIVITY, COMPENSATION	(A/C)	100.000	92.785	92.310	91.600	78.867
PRODUCTIVITY, DEFL COMP	(A/D)	100.000	99.094	104.310	109.920	103.394
COMPENSATION/EMPLOYEE-YEAR	(C/B)	100.000	106.726	112.586	124.239	138.997
UNIT LABOR COST	(C/A)	100.000	107.776	108.331	109.170	126.796
DEFL UNIT LABOR COST	(D/A)	100.000	100.914	95.868	90.975	96.717
UNIT LABOR REQUIREMENT	(B/A)	100.000	100.984	96.221	87.871	91.222

EXHIBIT III (CONTINUED)

TOTAL (MEASURED, NON-MEASURED AND SUPPORT)		1977	1978	1979	1980	1981
DATA						
WEIGHTED OUTPUT		49,751.000	48,825.400	51,255.100	55,536.000	56,345.900
OUTPUT INDEX	(A)	100.000	98.140	103.023	111.628	113.256
EMPLOYEE-YEARS		49,751.000	49,306.000	49,318.000	48,800.000	51,400.000
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COMPENSATION INDEX	(C)	100.000	105.771	111.606	121.864	143.604
DEFLATED COMP LINKED		665,986.000	659,571.161	657,768.142	676,333.333	729,504.958
DEFL COMP INDEX	(D)	100.000	99.037	98.766	101.554	109.538
CALCULATION, INDEXES						
PRODUCTIVITY, EMPLOYEE-YEAR	(A/B)	100.000	99.025	103.928	113.803	109.622
PRODUCTIVITY, COMPENSATION	(A/C)	100.000	92.785	92.310	91.600	78.867
PRODUCTIVITY, DEFL COMP	(A/D)	100.000	99.094	104.310	109.920	103.394
COMPENSATION/EMPLOYEE-YEAR	(C/B)	100.000	106.726	112.586	124.239	138.997
UNIT LABOR COST	(C/A)	100.000	107.776	108.331	109.170	126.796
DEFL UNIT LABOR COST	(D/A)	100.000	100.914	95.868	90.975	96.717
UNIT LABOR REQUIREMENT	(B/A)	100.000	100.984	96.221	87.871	91.222

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multiplied by the base weight to create a weighted output, again based on the 1977 employee-years element. The other inputs required for trend analysis, employee-years and compensation, are gross numbers not requiring conversion by weights. However, because 1977 was established as a base year, all input elements are set at 100.000 or 100 percent. Each succeeding year's input element is converted to a percentage based on the original year's gross numbers. Thus, note that on each of the Exhibits, items (A), (B), and (C) are actually presented as a percentage based on their value in relationship to the value of the same input element in the base year 1977.

The productivity of trend indices computed, both for the measured and total activities computations, are now relatively straightforward. For example, the productivity per employee-year for Exhibits I, II, and III is computed by dividing the weighted output (A) by the employee-years (B), both based on their respective percentages rather than their gross numbers. Each of the other indices is computed in a similar manner.

Comparing the three Military Medical Services for hospitals is rather interesting in that each is achieving different hospital productivity indices in a different manner. For example, the data for the U.S. Air Force shows a decrease in productivity through fiscal year 1981. This occurred because the weighted output element decreased from 25,196

in Fiscal Year 1977 to 24,395.175 in Fiscal Year 1981 while the employee-years element remained relatively constant at 33,461 in Fiscal Year 1977 and 33,630.215 in Fiscal Year 1981. The U.S. Navy's productivity also decreased for medical services, but for a different reason. In this latter situation, the weighted output element decreased from 18,614 to 18,375.329 from Fiscal Year 1977 to 1981. However, the employee-years element increased from 23,678 to 24,458 for the same time period. The U.S. Army's medical service indicates an apparent increase in productivity. While weighted output increased from 49,751 to 56,345.900, employee-years remained relatively stable at 49,751 and 51,400 from Fiscal Year 1977 to 1981, thereby accounting for this apparent increased productivity. The exhibits also illustrate other computations which are possible with the reported data, such as compensation/employee-years, unit labor cost, etc.

The DPPO maintains a dual data base of input elements for productivity indice computations. One set of data is considered "accepExhibit" for use by the Bureau of Labor Statistics and is submitted to them for productivity computations. These indices are then returned to the submitting agency for their analysis and use. The other set of data is maintained by the DPPO for its utility in visualizing productivity trends for internal management purposes within the Department of Defense. The DPPO measurement base contains over 40 different functions, one of which is medical services, derived

from elements submitted by the military services and defense agencies covering a wide variety of functions performed within the Department of Defense [Ref. 11: p. 3]. Whipple, et al., who evaluated the DPPO, indicated that the DPPO activities are "heavily skewed toward descriptive rather than analytical or prescriptive topics" [Ref. 21: p. II-9]. It would thus appear that DPPO is only presenting one view of what has occurred in productivity trends rather than analyzing what can be done to increase or change these indices.

Beginning in 1973, the Composite Work Unit data as well as other productivity input elements has been submitted to the Bureau of Labor Statistics for use in productivity computations of the Federal Productivity Program. Contact with the Director for Productivity Statistics indicates that this data is gathered for not only Department of Defense medical services, but from all federal agencies providing medical services such as the Veteran's Administration and the Department of Health and Human Services. The Composite Work Unit data from all agencies providing medical services is aggregated into a Federal Composite Work Unit which allows federal medical productivity indices to be computed.

The product measurement units from all other agencies providing non-medical care services, is aggregated with the medical services indices to produce an overall productivity index for the Federal government. This final grouping of data is derived from 28 different groups such as: plants and

buildings, medical services, and legal services. From these aggregated work units, the annual federal productivity indexes are computed. These productivity indexes are normally printed and available for each fiscal year; however, this information was not published for this past fiscal year. The publication normally issued by the Bureau of Labor Statistics and containing this information is the Handbook for Labor Statistics.

Along with federal productivity indices, the Bureau of Labor Statistics also develops private sector productivity ratios. The gross national level productivity statistics are developed from the national income accounts which represent those segments of the economy which consist of the ultimate output of the entire nation. It should be noted that comparing the Department of Defense productivity indices with the private sector indices has many inherent problems stemming from the differences in activities that are covered, measurement methodologies, and concepts for measurement that are utilized [Ref. 11: pp. 13-15]. Another official publication of the Bureau of Labor Statistics, the "Monthly Labor Review," contains only productivity indices for the civilian sector and has no data for the federal government.

The Composite Work Unit is also submitted with the annual budget to Congress to justify funding requests as well as personnel requirements for the medical services. Exhibit IV is an example of the forecast Composite Work Unit as submitted

to Congress with the Fiscal Year 1984, Operations and Maintenance, Navy budget request, as well as historical data for several past fiscal years. This particular data in the exhibit is for Naval station hospitals and clinics.

EXHIBIT IV

Historical Workload Data for Station Hospitals and Medical Clinics

	Workload	Conversion Factor	Composite Work Unit
Average Daily:			
Occupied Beds	2,268.8	x1	2,268.8
Admissions	406.2	x10	4,062.0
Outpatient Visits	22,832.0	x.3	6,849.6
Births	58.8	x10	588.0

FY 84 Composite Work Unit Total 13,768.4

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Historical Workload Data for Station Hospitals and Medical Clinics

Workload Factor	FY 1982	FY 1983	FY 1984
Average Daily:			
Occupied Bed Days	2,034.6	2,147.0	2,268.8
Admissions	357.1	378.6	406.2
Outpatient Visits	21,261.5	21,961.5	22,832.0
Births	51.4	54.6	58.8
Average Daily Composite Work Units	12,498.0	13,067.4	13,768.4

C. DISCUSSION AND CRITICISMS

The DPPO has published Department of Defense productivity overviews on an annual basis which includes medical services productivity. Since 1967, using the Composite Work Unit, the DPPO has calculated that medical services productivity has declined at an average annual rate of 2.3 percent. This has occurred because apparent output during Fiscal Year 1967 to Fiscal Year 1978 decreased at a 2.1 percent annual rate while employee years input increased at a .2 percent rate. This Department of Defense trend yields a 15 percent overall drop in productivity during the period of Fiscal Year 1967 to 1978 [Ref. 20: p. IV-20].

A study performed by staff members at the Naval Medical Data Services Center contained an entirely different conclusion. In that report the Composite Work Unit per hospital employee was adjusted to compensate for the distortion in measuring productivity trends caused by several factors and concluded that, while productivity in naval facilities did not keep pace with productivity trends in civilian medical facilities, there was an overall increase in productivity in naval facilities [Ref. 22: pp. 10-13].

This later study indicates that since 1973 there has been an increased pressure for military medical facilities to decrease inpatient lengths of stay, ultimately affecting the total numbers of occupied bed days used in computation of Composite Work Units. This resulted in a decline in occupied

bed days by 57.3 percent as average length of stay for inpatients declined from 12.68 days in 1973 to 5.92 days in 1979. While this drop in length of stay was a policy success, it had the added effect of decreasing perceived productivity in naval hospitals as measured by the Composite Work Unit.

The method of computing the Composite Work Unit does not have a built-in factor to account for such change. In the study performed at the Naval Medical Data Services Center, the point is made that the Composite Work Unit "makes no distinction between a 'necessary' occupied bed day and an 'unnecessary' occupied bed day." Accordingly, each unnecessary occupied bed day will increase the average daily occupied bed day input factor and inflate the total value of the Composite Work Unit and, hence, measured productivity [Ref. 22: pp. 5-6].

Briefly, the results obtained by this study were computed by: (1) taking two years for comparison purposes, 1973 and 1979; (2) adjusting occupied bed days to correspond with the length of stay which existed in 1979; (3) computing Composite Work Units for both years; and (4) adjusting both years by the American Hospital Association's "Hospital Intensity Index." This Hospital Intensity Index is a weighted average of hospital input components, based on period input prices so that the impact of change in the index is proportional to its importance in overall input cost [Ref. 22: p. 9]. Exhibit V is provided to demonstrate the differences in the computations.

EXHIBIT V

Comparison of Composite Work Units and Comparative Services Indexes at Naval Facilities for 1973 and 1979

Indicator	1973	1979
Daily:		
Composite Work Units, Unadjusted	19,237	
Composite Work Units, Adjusted	16,515	14,502
Comparative Service Indicators	20,018	22,794
Personnel	23,086	24,865
Composite Work Unit, Unadjusted per Employee	.8333	
Composite Work Unit, Adjusted per Employee	.7154	.5832
Comparative Service Indicator per Employee	.8671	.9167

Thus, decreasing the average length of stay by 57.3 percent, adjusting the occupied bed days accordingly, adjusting the Composite Work Unit by the American Hospital Association's Hospital Intensity Index, and including an increase in employee year's input, demonstrates an actual increase in productivity. Despite drawbacks in the Hospital Intensity Index as a conversion factor for the Composite Work Unit, the study noted that it "may be useful in adjusting more traditional workload indicators for service intensity" [Ref. 22: p. 14].

The Composite Work Unit assumes that all occupied bed days are equivalent; however, patients require differing

amounts of medical care based on illness, severity, age, sex, and complications. Many authorities in the health care community believe that hospitals are expending more effort per patient today than ever before; yet if the extra effort decreases hospital stay, productivity as defined by the Composite Work Unit actually shows a decrease [Ref. 15: p. 4].

Literature dealing with the Composite Work Unit as a workload or productivity indicator contains numerous criticisms of its use as a trend measurement. Many critics are of the opinion that the Composite Work Unit does not adequately reflect the changing character of the workload in military medical facilities. A tri-service study performed several years ago concluded that the initial 3 to 5 days of an inpatient stay required approximately 10 times the staff utilization for later periods of hospitalization. Therefore, manpower requirements of hospitals who emphasize short lengths of stay must be viewed from the standpoint of patient turnover and not on the Composite Work Unit which does not take this rapid turnover of patients into consideration [Ref. 19].

In addition, technological advances in the diagnosis and provision of medical services to all patients have occurred rapidly since the mid 1950's. Technological advances and the affected product mix have become more and more complex since the implementation of the Composite Work Unit. Services such as renal dialysis, cardiac diagnostic studies, abortion

services, inhalation therapy, organ banks and transplants, complex radiological procedures as well as numerous and complex laboratory studies, to name but a few, were not adequately accounted for in the Composite Work Unit computations [Ref. 15: p. 15].

Another criticism of the Composite Work Unit is that it does not differentiate between different types of manhours, but rather assumes that all manhours are equivalent. A physician, nurse, or ancillary personnel are equal in so far as manhours are concerned. It is obvious that the required hours of different types of "professionals" should not be aggregated in order to quantify work. "Time is not a pure factor and one hour of physician time has considerably greater relative value than a similar amount expended by an orderly" [Ref. 18: p. 8]. In addition, an outpatient visit can be produced by differing mixes of manhours of physicians, nurses, corpsmen, or ancillary personnel requirements. Nevertheless, the Composite Work Unit will measure the same workload irrespective of differing services provided by different professionals or cost of the time of the professionald.

The Composite Work Unit does not make a distinction between an "easy" case and a "hard" case. An "easy" case is defined as a patient who requires very little in the usage of hospital resources while the opposite is true of a "hard" case. Thus, when comparing hospitals which provide medical services which are extensive and complex in comparison to

hospitals which provide routine non-complex medical services, the latter hospital may appear to be more productive. This would certainly be the case if a higher proportion of patients were admitted and/or evaluated in the less complex setting. This problem will be discussed in much more depth in the next chapter when reviewing the different services' methods in treating patients with the same or similar diagnosis, both on an inpatient and outpatient basis.

As has previously been noted, the Composite Work Unit was developed as a tool to be utilized in computing staffing requirements and later became accepted as a workload measurement. Still later, this unit became a means to justify funding requirements for total patient care facilities which is an entirely different function than that for which it was developed. A study performed in 1972 at the Naval School of Health Care Administration indicates that "in using Composite Work Units as a general resource allocator, we would be forced to say that the Bureau of Medicine and Surgery required approximately 2 percent more funds in fiscal year 1971 than it required in fiscal year 1957." This was based on the findings that the total average daily Composite Work Unit increased 1.76 percent from Fiscal Year 1957 to 1971. This statement was also based on the assumption that the funding required to produce one Composite Work Unit was the exact duplicate in Fiscal Year 1971 as it was in Fiscal Year 1957. Obviously the assumption that cost remained constant

per Composite Work Unit over a 14 year period is ludicrous. All prices of factors which constitute providing medical care had greatly increased, much more so than the costs associated with other segments of the economy. Further, the factors which were utilized to provide medical services had changed as previously mentioned. During the period of Fiscal Year 1957 to 1971, the cost associated with exactly the same quantity of medical care had increased approximately 80 percent. The conclusion of this study was that at a minimum, the base unit of the measure should be adjusted to reflect absolute changes in prices of the factors involved in meeting workload requirements [Ref. 18: pp. 19-20].

Since it has been re-validated on at least two occasions, the military medical services did not feel that the Composite Work Unit had sufficient negative aspects to warrant a drastic change. As a workload measurement input, the U.S. Army in a test of 22 medical facilities in February of 1974, attempted to test the validity of the Composite Work Unit as a staffing tool. The test concluded that although there was some seemingly staff maladjustments within categories, the Composite Work Unit utilized to determine these levels was reasonably accurate for the aggregate staffing projections [Ref. 23: p. 42].

From Exhibits I, II, and III, it should be apparent that comparisons among the three military medical services may be difficult, if not impossible, with the data presented. The

U.S. Navy and U.S. Army indexes are computed using the Composite Work Unit as an output element, while the U.S. Air Force indexes are computed utilizing the data obtained from the Adjusted Admission Equivalents. Data was not available to determine if the Adjusted Admission Equivalents would compute similar numerical indices if Composite Work Units were utilized rather than the Adjusted Admission Equivalents. This criticism is not directed at the Composite Work Unit, but rather the fact that two different methods for measuring the output elements is utilized by the Uniformed Services which may preclude inter-service comparisons.

III. THE HEALTH CARE UNIT

A. INTRODUCTION

In January 1979, the Office of the Assistant Secretary of Defense for Health Affairs commissioned the development of a new measurement intended to eventually replace the existing Composite Work Unit. This action was prompted by the well-known shortcomings of the Composite Work Unit previously discussed, and the implementation of the Uniform Chart of Accounts. The Uniform Chart of Accounts is an expense and workload accounting system utilized by all Department of Defense hospitals beginning in 1980 [Ref. 24: p. 11].

The Uniform Chart of Accounts was designed to stepdown overall cost assignments in final, commonly defined, operating expense accounts. The hierarchy of accounts begins with a grouping of six categories reflecting total expense and workload data: Inpatient Care; Ambulatory Care; Dental Care; Ancillary Services; Support Services; and Special Programs. Each of these Functional Accounts is broken down into Summary Accounts and further, into Subaccounts; however, all expenses are ultimately aggregated into four final operating expense accounts: Inpatient Care, Ambulatory Care; Dental Care; and Special Programs. Exhibit VI is an example of this hierarchical process:

EXHIBIT VI

Uniform Chart of Accounts Hierarchy

ACCOUNT	UCA Code
Functional Category: Inpatient Care	A
Summary Account: Medical Care	AA
Work Center Account: Internal Medicine	AAA

UCA = Uniform Chart of Accounts

Thus, the first level code, A, represents the Functional Category, the second level code, AA, indicates a Summary Account, and the third level, AAA, defines the Subaccount. Two of the Functional Account Categories, Ancillary Services and Support Services, are considered intermediate expense accounts and are ultimately assigned to final operating expense accounts for Inpatient Care, Ambulatory Care, Dental Care, and Special Programs [Ref. 25]. For further explanation of the Uniform Chart of Accounts, see Appendix A. It was the opinion of the staff in the Office of the Assistant Secretary of Defense that this newly implemented hospital accounting system would lend itself to development of a new and more accurate hospital workload measurement system [Ref. 24: p. II].

The initial design and formulation of a new approach to measuring hospital workload was conducted by members of the Department of Mathematical Science at the U.S. Air Force

Academy. Their final report, produced in June 1980, presented a new approach to the assessment of output of Department of Defense hospitals which was designated the Health Care Unit.

At the beginning of the study, specific characteristics of the desired output were addressed. A decision was made that the Health Care Unit: (1) be expressed as a single number; (2) not be adjusted for facility type; (3) make minimal use of proxies; (4) use existing data bases; (5) be adaptable and flexible to allow for future changes as required; (6) not measure quality of care but rather quantity of care provided; and (7) be useful at all levels throughout the organization [Ref. 15: pp. 6-8].

B. APPROACH AND FORMULATION

The general approach taken in the development of the Health Care Unit was to partition the totality of types of care produced into homogeneous categories; determine the number of "treatments produced"; take a weighted sum to smooth out the differences in treatment requirements; and, finally, to compute a single number that indicates hospital output.

The designers of the Health Care Unit decided that the Uniform Chart of Accounts adequately provided the needed basic performance factors because it reports costs and workload data aggregated into six inpatient care accounts, eleven ambulatory care accounts, and two dental accounts.

This information from field activities is submitted to higher organizational levels via the Medical Expense and Performance Report which is divided into the 25 Performance Factors contained in Exhibit VII [Ref. 15: pp. 11-12]. It should be noted that these Performance Factors are in actuality the Summary Accounts of the Uniform Chart of Accounts.

EXHIBIT VII

Performance Factors

Inpatient Care Dispositions

1. Medical
2. Surgical
3. Obstetrical/Gynecology
4. Pediatric
5. Orthopedic
6. Psychiatric

Inpatient Care Occupied Bed Days

7. Medical
8. Surgical
9. Obstetrical, Gynecology
10. Pediatric
11. Orthopedic
12. Psychiatric

Ambulatory Care Visits

13. Medical
14. Surgical
15. Obstetrical/Gynecology
16. Pediatrics
17. Orthopedics
18. Psychiatric/Mental Health
19. Family Practice
20. Primary Medical
21. Emergency Medical
22. Flight Medicine
23. Underseas Medicine

Dental Care Weighted Dental Procedures

24. Dental Services
25. Dental Laboratories

Following determination of the performance factors, the mathematical formulation of the hospital product measure was established as:

$$HCU = \sum_{i} P_i W_i$$

where:

P_i = the ith performance factor. For example, p_1 = 3750 defines 3,752 dispositions from the medical service;

W_i = the weight factor which will be computed from the cost of providing medical services and the cost of providing the corresponding performance factor health services.

Determination of W_i, the Weight Factor in the formulation is a difficult undertaking. The purpose of applying a weight to each Performance Factor is to determine the relative value of that Performance Factor in relationship to another and to allow a single overall product measure for health services. Thus, the weight allows determination of the relative value of one service provided in relationship to another: "what is one outpatient visit to the surgical clinic worth relative to the same visit in a medical clinic" or the ratio of W_{14}/W_{13}. It should also appear that since the Health Care Unit is based on resource usage, it indicates the intensity of the care required for that specific Performance Factor. Using the foregoing computation, the Health Care Unit can be defined as "that amount of care which has the value of one dollar or, one dollar's worth of care" [Ref. 15: pp. 11-15]. This appears to be true because each Health Care Unit has been calculated on the basis of what monetary resources were required to produce that specific unit. Thomas, et al., used

a similar equation to formulate a measurement output system for Veteran's Administration Hospitals. The equation that they proposed utilized somewhat different components for the performance factors, but they indicated that weight factors for the output components would be derived by their relative consumption of resources based on regression analysis of their respective cost [Ref. 26: p. 722].

C. APPROACHES TO WEIGHTS

During the initial formulation of the Health Care Unit, the designers considered several different approaches to determining the weights and the data available to compute these weights.

The first approach considered was use of the internal cost data which was available from the Medical Expense and Performance Report which is utilized by all three military medical services. This document reports costs by the 19 major functional accounts as contained in the Uniform Chart of Accounts. This approach was further subidivided into four different methods for weight factor development considerations:

1. Use overall average cost per service (or Performance Factor), i.e., take Department of Defense-wide total cost for all medical services provided and divide this number by the sum of the Performance Factors which results in the average cost per performance factor.

E.g.,

$$W_i = \text{UCA Costs DOD-Wide } P_j / \sum P_j$$

2. Use the mean by hospital, i.e., the average cost for each performance factor at each hospital is computed, the average of these averages is then computed, and this number becomes the weight. E.g.,

$$W_i = \text{UCA Costs } P_j/\text{Hospitals}$$

3. Use the mean by hospital, but adjusted for extremes, i.e., the same as number (2), but disregarding outliers, that is, those numbers which are more than an established specific number of standard deviations from the mean are discarded.
4. Use median by hospital, i.e., the same as number (2), the average cost per Performance Factor is determined for each hospital, then these means are arranged in order of value and the "middle" number is selected as the weight [Ref. 15: p. 14].

The resulting weight derived from any of the foregoing weight development formulations would then simply be multiplied by the respective performance factor total to calculate the output index for that specific Performance Factor which could then be used by all hospitals. In contrast, Thomas,

et al., utilized peer groupings for weight factors when designing the system for the Veteran's Administration Hospitals. This system involved placing hospitals into groups based on similarities in terms of total facility output [Ref. 26: pp. 716-717].

Another method considered for weight development was to use data external to the organization. Civilian hospitals or treatment facilities provide comparable medical services in almost all categories of the above established Performance Factors. An apparent difficulty in using this approach is that civilian physicians normally bill patients individually for both inpatient and outpatient care apart from care charged by the hospital. In viewing civilian costs of medical care, costs for medical care that the Department of Defense incurs under CHAMPUS, the Civilian Health And Medical Program of the Uniformed Services were considered. This program is for medical care provided to dependents and retired members at civilian hospitals with payment shared by the patient and the Department of Defense. Cost information for this care is readily available through systems already established in the Department of Defense, while national civilian medical care costs would be much more difficult to obtain [Ref. 27: pp. 14-15].

In using external data, a decision would also have to be made to determine whether to use national, regional, or local average costs. A problem which immediately arises is

that costs for health services and facility expenses are not uniform from one geographical area to another. Thus, using local or regional data for weight computations would not allow applicability of these weights from one area to another. In a similar fashion, using weights that are developed from national health services cost data would give inappropriate weights to facilities providing similar services but in different geographical areas. This apparent inadequacy of weight determination from data obtained from civilian sources applies to weights developed from data obtained from military sources but to a lesser degree as will clearly be demonstrated later. For example, civilian physician fees are not uniform, but vary even in the same local area; however the salary of a military physician is essentially stable regardless of the area in which he/she provides health services. The same can be said of civilians employed by the military services, that is, a GS-5 will generally be paid the same salary regardless of the area in which he/she is employed. This standardized wage or salary consistency is not true of employees of civilian facilities in that a nurse's salary may differ depending upon the hospital or geographical area of employment.

An additional problem which had to be considered by the designers was that the Performance Factors contained somewhat similar information for inpatient care, that is dispositions and occupied bed days. The information for both factors is

obtained for the same patient for the same period of hospitalization, essentially covering the same care. To allow for this apparent duplication of information, the following approaches were each considered: (1) use dispositions in the weight computation, that is, set W_7 through W_{12} at 0 and only use W_1 through W_6; (2) use occupied bed days, set W_1 through W_6 at 0, use W_7 through W_{12}; (3) use direct regression on output for each of the inpatient categories which would be a weighted sum of dispositions and occupied bed days; or (4) use indirect regression, methods (1) and (2), in convex linear combinations and select the best number explaining the variation in expense from one hospital to another [Ref. 9: p. 16].

The next weight consideration was to determine or evaluate how often, and in what manner, the weights should be updated. For example, should it be evaluated continuously, quarterly, annually, and should it be by base year, cumulative or done by exponential smoothing [Ref. 15: pp. 17-18]?

D. DESIGNER'S FINAL RECOMMENDATION

In June 1980, the designers of the proposed Health Care Unit presented their final recommendations concerning the Health Care Unit, its input factors and sample calculations. They recommended that the 25 final accounts of the Uniform Chart of Accounts be used as the Performance Factor inputs as originally designed. To determine the corresponding Performance Factor weight, they recommended that for the

outpatient accounts, each hospital's final outpatient cost account be divided by the sum of the corresponding Performance Factor. E.g.,

$$W_i = \text{Hospital UCA Cost } P_j / \sum P_j$$

This results in a cost per Performance Factor. These resulting numbers from each hospital are combined and a mean and standard deviation are computed. Any numbers which deviate by more than two standard deviations would be discarded and a new mean would be recomputed. These numbers would then individually be divided by the Fiscal Year average cost per disposition to obtain the final weights. E.g.,

$$W_i = P_j/\text{Average FY Cost per Disposition}$$

Thus, Health Care Units for Outpatient Performance Factor weights are determined relative to their value based on the average cost of inpatient dispositions [Ref. 3: pp. 25-26]. For example, Exhibit VIII contains the original and modified weights that were computed using the original data. The original weight computed for each outpatient performance factor is actually the average cost of a visit to that specific service for all hospitals that were involved in providing data for health care unit computation testing. Thus a visit to the medical service actually cost $21.21 per visit. The modified weight is this $21.21 divided by the

EXHIBIT VIII

Outpatient Performance Factor Weights

Performance Factor	Original Weight	Modified Weight
13. Medical CV	21.21	.019
14. Surgical CV	27.96	.025
15. OB/GYN CV	19.62	.017
16. Pediatric CV	17.85	.016
17. Orthopedic CV	31.89	.028
18. Psych/MH CV	22.10	.020
19. Family Practice CV	19.31	.024
20. Primary Medical CV	19.31	.017
21. Emergency Medical CV	23.21	.021
22. Flight Medicine CV	31.44	.028
23. Underseas Medicine CV	5.55	.005
24. Denta- Services WDP	7.08	.006
25. Dental Laboratories WDP	1.80	.002

Note: CV = per Clinic Visit
WDP = per Weighted Dental Procedure

average cost per fiscal year disposition cost of $1,129.89. This modification is performed for each of the outpatient accounts resulting in a weight which reflects the outpatient visit in relationship to its value to disposition cost.

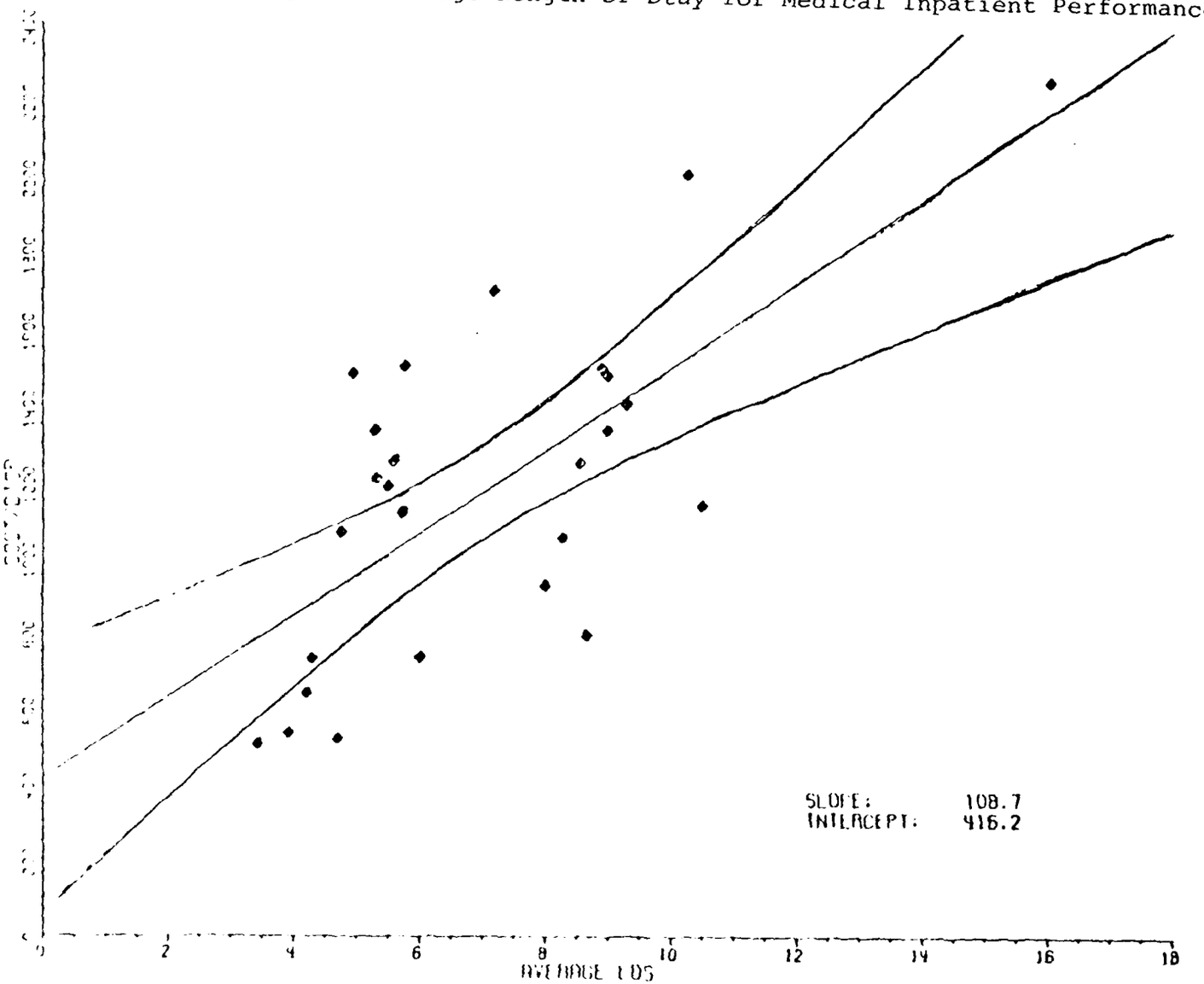
To determine the weights required for the Inpatient Performance Factors, a "length of stay" regression was recommended.

For this computation, each hospital inpatient account had the average length of stay calculated by dividing the total occupied bed days of that account by the total number of dispositions for the same account. The cost for each disposition is also calculated. Next, each of these pairs of points, length of stay and cost per disposition, is plotted and a least square fit is accomplished. The weight of the inpatient disposition factor for the corresponding individual weight Performance Factor is to be the point at which the regression line intercepts the vertical axis, while the weight for the corresponding occupied bed day account is the slope of the regression line, both divided by the Fiscal Year Average cost per disposition [Ref. 27: pp. 35-40]. Exhibit IX is an example of this process for the Medical Care Inpatient Performance Factors. Thus, as in the computation of the outpatient performance factors, the weight is determined relative to its value based on the average cost per disposition. Exhibit X is provided to illustrate the weights for the inpatient performance factors, both original and modified.

It was recommended that no specific time frame be used for updating the weight factors. Rather, at 3 to 5 year intervals, weights should be recomputed to determine if any significant changes had occurred. The designers felt that this would provide stability in the weights to allow output measurements to be easily interpreted and to be comparable over a period of time. At the same time, they felt that

EXHIBIT IX

Average Cost/Disp vs. Average Length of Stay for Medical Inpatient Performance Factors



AVERAGE COST/DISP VS AVERAGE LOS FOR MEDICAL CARE(MINUS OUTLIERS)

EXHIBIT X

Inpatient Performance Factor Weights

Performance Factor	Original Weight	Modified Weight
1. Medical Disp	416.2	.368
2. Surgical Disp	404.5	.358
3. OB/GYN Disp	375.3	.332
4. Pediatrics Disp	87.0	.077
5. Orthopedic Disp	1080.0	.956
6. Psychiatric Disp	825.2	.730
7. Medical OBD	108.7	.096
8. Surgical OBD	163.6	.148
9. OB/GYN OBD	132.0	.117
10. Pediatric OBD	143.7	.127
11. Orthopedic OBD	29.1	.026
12. Psychiatric OBD	48.3	.043

this method would update the weights to maintain accuracy and reflect the present level of medical services output [Ref. 27: Pp. 17-18,32].

The actual computation of the Health Care Unit, once these operations are accomplished is relatively easy, be it for hospital, military service, or Department of Defense in total. The Health Care Unit can also be used in the same manner as the Composite Work Unit for calculating productivity indices. For example, it can be expressed as Health Care

Units per physician, per employee, per employee manhours, etc. In this formulation, the Health Care Unit was presented to the Department of Defense for review. Following review by the three medical departments of the military services and the Office of the Assistant Secretary of Defense for Health Affairs, the decision was that it would not be implemented, but would require further analysis to determine the validity of the weighting scheme, implementation, and possible refinement [Ref. 24: pp. 1-2].

E. INITIAL REFINEMENT

In 1981, the Department of Defense contracted with a civilian agency to further develop the Health Care Unit, and in December of that year a report was submitted which made recommendations for possible refinements to the basic unit. The major change recommended was that hospitals be placed in peer groupings. This recommendation was based on the premise that hospitals vary with the nature and complexity of cases handled. Such variations occur because of the tendency to concentrate medical expertise in selected hospitals which can provide more and better care to those patients who require complex diagnostic procedures, therapies or follow-up specialized care.

The military medical services already had three designations for facilities based on the type of care provided: (1) primary, an initial contact facility providing primary

care; (2) secondary, a facility providing some set of specialty care; and (3) tertiary, a facility which provides indepth treatment of complex cases, generally a regional or national medical center. In order to assure hospital peer grouping across the three military medical services, a scheme based on peer grouping thresholds was devised. The grouping would consist of facilities placed in Categories I, II, or III. The basis for inclusion in each separate group would be on Health Care Units accumulated, Full Time Equivalent (a FTE is generally considered to be one employee's annual total working hours including leave, both regular and sick) number of physicians, and operating beds of the facility. For example, a Category Group I facility would be required to have 0-9,000 Health Care Units, less than 500 Full Time Equivalents, less than 30 physicians, and less than 70 operating beds [Ref. 25: pp. 4-16].

The weights would be computed using the indirect regression method described in the original study, with the resulting number being divided by fiscal year average cost per disposition. Each patient admitted would be considered one disposition, all costs on the day of admission would be considered "fixed charges," and all costs for the 2nd and subsequent occupied bed days would be "variable charges." Thus, this method would eliminate the need to set Performance Factor Weights 1 through 6, or 7 through 12 at 0 because each weight for the corresponding Performance Factor for that specific

inpatient stay would each gain a portion of the "credit" for the care provided.

For example, the weight for a Category I facility for the Inpatient Medical Service would be:

$$W_1 = 329.30/990.44 = .332$$

$$W_7 = 113.6/990.44 = .114$$

where:

329.30 is the fixed cost ($/disp) for Inpatient, Medical, Category I facility, Disposition;

113.6 is the variable cost ($/bed days) for Inpatient, Medical, Category I facility, Occupied Bed Day;

990.44 is the average fiscal year cost per disposition.

The normalized weights for the other Inpatient Performance Accounts and Outpatients Accounts would be computed in a like manner. It was concluded that the peer grouping and the manner in which weights would be computed would provide a single measure of product for each facility and account for differences in case mix, differing levels of care, and case complexities [Ref. 25: pp. 19-33].

Upon completion, the study was evaluated by both the Office of the Secretary of Defense and the individual military medical services. Following this evaluation, there was

non-concurrence for implementation, at least on the part of the U.S. Navy. The Navy's reason for rejecting this methodology for output measurement was essentially based on a study of admission rates of the separate military services. As a product measurement system, the health care unit does not measure the actual output of a hospital, but rather, a quasi-output. For example, it still includes the measurement of occupied bed days. Using this factor as an input, one must assume that all bed days occupied in a hospital for a given illness are required, and also that the hospitalization is required for the given illness.

A comparison of admission rates for the three services demonstrated that the admission rate per 1,000 average strength was dissimilar. For the U.S. Army and U.S. Air Force, it was found to be 150.9 and 148.0 respectfully, while for the U.S. Navy it was only 96.0. This discrepancy in admission rates was attributable to the different treatment modalities of choice utilized within the separate military services. Whereas the U.S. Air Force had an admission rate of 10.1 (per 1,000 average strength) for dental disorders, the U.S. Navy and U.S. Marine Corps only had an admission rate of .3. This same study also demonstrated admission rates of 16.8 and .3, respectively, for the U.S. Army and U.S. Navy with regard to admissions for common upper respiratory infections [Ref. 28].

Obviously, the explanation for the Navy's non-concurrence is that treatments which are performed on an outpatient basis require less resources, and thereby gain less "credit" for productivity indices than the same illness treated as an inpatient. Thus, based on the manner in which Health Care Units are computed, the Navy would demonstrate less workload "credit" because of the differing choices of treatment for the same illness in the three military medical services. A far greater impact could occur in the event that the Health Care Unit came into use as an input element into an equation developed to allocate resources for health services. In this latter instance, the Navy would either have to change treatment modalities, i.e., begin admitting those patients that are routinely being admitted by the other two military medical services, or possibly lose some of its ability to obtain required resources. This is based on the assumption that although adequate funding may be provided for the projected Health Care Units, capital investments and small equipment acquisitions may prove difficult to obtain because of workload numbers. This would thus affect purchases of equipment which are "state of the art" and may only be necessary to provide higher quality of care.

Accordingly, the Department of Defense contracted with another civilian firm to attempt a further refinement of the Health Care Unit.

F. PRESENT HEALTH CARE UNIT

In mid 1983, the study concerning refinement of the Health Care Unit was completed and presented to the Department of Defense. The major refinement was to return to the basic 25 preliminary Performance Factors with their corresponding weights. This study concluded that there was no necessity to have peer groupings in the computations. A point was made in this study that there is a "tendency to continually increase the number of product categories which is caused by the desire to achieve homogeneity within each category." The most important reason for deletion of the peer groupings was that the "weights computed by the peer group is likely to confuse inefficiency with case mix complexity, and potential users expressed a desire to have all hospitals use the same set of weights to simplify application" [Ref. 29: pp. 3-3,4].

In addition, it was determined that using peer groupings resulted in weights that gave increased value for certain types of care in smaller, less complex facilities than the same type of care provided in large, complex facilities. To illustrate this weight inconsistency, Exhibit XI is provided from the first refinement study. While several of the Category II facilities have higher weights than that of the Category III facilities, all of the "fixed" weights, except for those of OB/GYN, in Category I hospitals are higher than the corresponding weight for Category III facilities. Thus, more credit is given to Category I facilities for the services

that are provided although the Category III facilities generally provide much more complex, and specialized health services with highly sophisticated capital equipment and therapies [Ref. 27: pp. 6-7]. A possible explanation of this inconsistency in cost of health services may be that smaller or less complex facilities are being rewarded with higher performance weights because of their inefficiencies based on the type of facility and care provided.

EXHIBIT XI

Normalized Inpatient Weights

Performance Factor	Category I	Category II	Category III
Medical			
fixed	.332	.434	.240
variable	.114	.130	.214
Surgical			
fixed	.761	.755	.511
variable	.139	.127	.197
OB/GYN			
fixed	.382	.350	.424
variable	.279	.180	.191
Pediatrics			
fixed	.609	.363	.491
variable	.066	.133	.163
Orthopedics			
fixed	.669	.602	.463
variable	.112	.099	.119
Psychiatric			
fixed	.558	.181	.499
variable	.079	.153	.127

[Ref. 3: p. 30]

Although the 25 performance factors and the basic design of the Health Care Unit remained unchanged, a different method for determining the inpatient weights was recommended. The weights calculated for the refined Health Care Unit are based on a subsample of average performance. That is, these subsamples are defined for each Uniform Chart of Accounts Summary Account. The bed day weights are calculated from a subsample consisting of middle fifty percent of the sample by number of disposition after eliminating those samples in the upper and lower quartiles of the sample. The first step requires that a regression on the subsample for each Inpatient Uniform Chart of Accounts Summary Account be performed to obtain the coefficients B_o and B_1. The next step requires that the application of the following linear equation be applied to each of the inpatient summary accounts:

$$EXP/DISP = B_o(DISP) + B_1(LOS)$$

where:

EXP = total summary account expense;
DISP = total summary account idspositions;
LOS = average summary account length of stay;
B_o and B_1 are regression coefficients.

However, it was determined that the parameters of this equation would increase significantly from year to year because

of hospital cost inflation, thus it would be necessary to utilize an additional parameter to compensate for this inflation. Accordingly, the equation was reformulated as:

$$EXP/DISP = (B_o + B_1(LOS)) + (1 + k_1 d(yr\ 1) + k_2 d(yr\ 2))$$

where:

k_1 and k_2 are the level of hospital inflation;

yr 1 and yr 2 are dummary variables taking the value of 0 for yr 1 and 1 for yr 2.

For example, B_o and B_1 may be derived through linear regression for Fiscal Year 1980, a base year. Then k_1 and k_2 are the level of hospital inflation for Fiscal Year 1980 to 1981, and 1981 and 1982, respectively. Accordingly, d(yr 1) is 1 in Fiscal Year 1981, and d(yr 2) zero for 1982.

Thus the formula was designed to allow use of a base year and use variables to adjust the inflation for the B_o and B_1 coefficients which were previously obtained by application of the sample data to regression.

Lastly, the refined Health Care Unit weights for each inpatient disposition and occupied bed day account can now be computed with the following equation:

$$W_{Disp} = B_o k_2 / \text{average cost per disposition}$$

$$W_{Obd} = B_1 k_2 / \text{average cost per disposition}$$

where:

W_{Disp} = weight for each inpatient performance factor disposition, or W_1 through W_6;

W_{Obd} = weight for each performance factor occupied bed day, or W_7 through W_{12}

with B_o and B_1 adjusted for the Fiscal Year values [Ref. 23: pp. A1-2].

Exhibit XII contains the weights for the Refined Health Care Unit in the form of dispositions, occupied bed days and outpatient visits. The data in this Exhibit is for Fiscal Year 1982 adjusted for inflation.

The refined Outpatient Visit and Dental Weights are computed for each Outpatient and Dental Performance Account after eliminating facilities in the upper and lower quartiles, and are based on average cost. This weight, as in the inpatient factor, is based on facilities operating in the middle 50 percentile of the sample. This refined weight is computed by:

W_{OPV} = Fiscal Year cost per account/average fiscal year cost per disposition

Thus, each Outpatient Account Weight is computed in terms of what the value of one outpatient clinic visit is valued at in relationship to one average inpatient disposition cost. Referring to Exhibit VII, it can readily be seen that Outpatient Weights are either at .030 or less and thus, requires

EXHIBIT XII

Refined Health Care Unit Weights

Performance Factor	Disposition Weight	Occupied Bed Day Weight	Visit Weight	Dental Procedure Weight
Inpatient Area				
Medical	.097	.137		
Surgical	.319	.137		
OB/GYN	.216	.148		
Pediatric	.121	.120		
Orthopedic	.604	.078		
Psychiatric	.330	.107		
Outpatient Area				
Medical			.022	
Surgical			.028	
OB/GYN			.021	
Pediatric			.017	
Orthopedic			.028	
Psychiatric			.026	
Family Practice			.021	
Primary Care			.021	
Emergency			.027	
Flight			.030	
Undersea			.015	
Dental Area				
Dental Services				.005
Dental Lab				.002

from 10 to 30 outpatient visits to equal one inpatient stay [Ref. 29: p. A3].

G. DISCUSSION AND CRITIQUE

The Health Care Unit as a product measure is superior to the Composite Work Unit because it partitions the inpatient care portions of the computation into separate categories, apportions outpatient care into categories, includes dental care, and ties the expense of providing this care into a unit. Thus, the Health Care Unit attempts to provide an output (medical care) in relationship to an input (resource consumption) in a single indice. This is in comparison to the Composite Work Unit which has only four gross inputs in its computation and it does not attempt to place any dollar value on the medical services provided. Thomas, et al., have indicated that incorporating differing types of inpatient and outpatient care factors into the output unit will reflect a more comprehensive view of the hospitals products. They indicated that this type of formulation should be effective for use in very large systems [Ref. 26: p. 732]. The composition of the Health Care Unit does this by utilizing the 25 Performance Factors which cover all of the gross products (i.e., medical, surgical, etc.) being produced in military health care facilities today. Nevertheless, most of the criticisms which have been leveled at the Composite Work Unit can also be directed at the Health Care Unit.

In examining the Health Care Unit, one must initially look at the system which provides the cost and workload data for the unit's computation, the Uniform Chart of Accounts. The use of the Uniform Chart of Accounts in respect to the Health Care Unit is to provide all of the necessary elements in a factual and accurate manner; therefore, this examination will only look at the Uniform Chart of Accounts in its role of providing data.

The Uniform Chart of Accounts was designed not to replace the existing financial accounting systems at medical facilities, but rather to supplement it by collecting and reporting expenses and workload data to higher authority via the Medical Expense and Performance Report. It is a system which is intended to provide full costing to medical programs which have been identified as final accounts [Ref. 25: pp. 1-13].

A problem which is immediately obvious is that the final account expenses do not necessarily come under the management control or responsibility of the chief of service responsible for that final account. For example, although a patient may be admitted to the Internal Medicine Service, the ward, ward staff, and ancillary services are not controlled by the Chief of Medicine or his/her physicians, nor does he/she control the cost of providing that service. Nevertheless, the methodology for computing the Health Care Unit for the service under his/her cognizance will utilize this cost data to determine the weights for workload indices that may impact upon the department.

Expenses for the ward as reported under the Uniform Chart of Accounts are aggregated into a cost pool to ultimately be divided amongst the final account users. The Uniform Chart of Accounts was designed with sufficient flexibility for the facility managers to determine their own allocation procedures for cost pools. Thus, it is conceivable that there are many different allocation procedures for cost pools throughout medical facilities in the Department of Defense, thereby providing minimal consistency to the application of the methodology for cost pool allocation.

If one considers the input components for the Health Care Unit, it should become immediately obvious that any indice which is a surrogate measurement system utilizing this workload and expense accounting will be limited to the scope of the performance factor dimensions. Thus, any of the criticisms which are presently directed at the Health Care Unit can also be directed at the Uniform Chart of Accounts.

The Health Care Unit, as envisioned, would share some similarities of the prospective payment scheme being formulated in some sectors of the civilian health industry, the Diagnosis Related Group, or DRG. The DRG is based on primary diagnosis, presence of secondary diagnosis, primary surgical procedure, secondary surgical procedure, age, and length of stay. Thus, a DRG is clinically and statistically related in regard to illness and length of stay [Ref. 30: pp. 47-48]. Both of these indices, the DRG and the Health Care Unit,

actually represent an estimated cost for resources used for one patient; the DRG in that a patient's illness would be paid for based on DRG and average cost for a patient stay within that DRG; a Health Care Unit not related specifically to diagnosis, but rather to the services utilized in providing health care to an individual patient based on a weighted cost factor.

Using occupied bed days as an input factor for workload computations adds several new problems. This factor can be easily manipulated to demonstrate increased workload and possibly has the added negative effect of decreasing emphasis on shortening lengths of stay for individual illnesses. For example, a facility with an inpatient capacity which is not being utilized to its fullest, may begin admitting marginally acceptable patients because of available beds and decreased workload reporting. One evaluation of the Health Care Unit recommended using dispositions as the only inpatient input factor for inpatients. This was recommended because each disposition should represent a fixed sum of occupied bed days. That is, each diagnosis should normally require a certain defined amount of inpatient care with upper and lower limits for lengths of stay [Ref. 29: pp. 5-6]. While this may appear desirable, it should be noted that the DRG's utilize this type of length of stay element and this does not necessarily provide corrective action. A study of "case-mix" with DRG's, found that DRG's established established

for one area do not necessarily apply to another geographic area. It was determined that those DRG's established for New Jersey did not apply to patients in Pennsylvania or Ohio, thus it will be necessary to adjust lengths of stay based on demographic conditions [Ref. 30: pp. 50-51].

In using the Health Care Unit, an assumption must also be made that all care provided is quality care as established by standards. For example, not only must an inpatient occupy a bed on a specific day, but that a specific type of care is provided such as appropriate diagnostic studies or therapy. In addition, it must be assumed that the diagnosis for which the patient was admitted is correct, and that all physicians are equally competent. This type of assumption must generally be made when viewing the inputs of health services as "products," rather than using the actual outputs of the system if they can be adequately defined.

Utilizing the Health Care Unit as a workload indicator with differing weights for different types of medical care provided could make some types of care more desirable because of their higher value. Looking back at any of the exhibits for Performance Factor Weights, it is obvious that it is preferable to have orthopedic or surgical inpatients rather than medical inpatients. Since orthopedic patients are granted the higher weight, workload data could be manipulated by admitting patients to the orthopedic service if the patient has both a medical and orthopedic problem, although

the patient should have been admitted for the medical problem. Surgical inpatient and outpatient care is also given greater emphasis for the weight factors than that which is given for medical services. The question then becomes, in order to be more "productive," should more emphasis be devoted to acquiring larger orthopedic and surgical staffs, the performance of more surgical procedures, thereby giving less emphasis to services with low weighted input factors?

The Health Care Unit does not consider the non-measurable factors in its computations. Although some of the factors are extremely important, they are not easily quantifiable. For example, a facility may be built, equipped, and staffed to provide differing levels of health services on a contingency basis. This occurs not only to meet war-time contingencies, but peace-time uses as well. There are facilities located in remote areas where civilian standby or specialized care is not available, but a requirement exists to have this care in that area; therefore the health services may not be utilized to the fullest extent possible.

The Health Care Unit does not provide for direct measurement of other standby services such as those obtainable in an emergency room environment. At some facilities, the emergency room is utilized 24 hours a day and thus accumulates workload inputs. Conversely, at some smaller hospitals, the emergency room is fully staffed to provide health services, but is only used sparingly because of non-occurrence of emergencies.

Health Care Units do not provide a measurement for training which is performed in most of the large complex facilities. However, many of the large tertiary facilities have a mission which includes the training of large numbers of interns and/or residents. The workload which is generated by these physicians only occurs when they are providing health services to patients, yet a large portion of their function is involved in research, training conferences, etc.

A question which should be answered is "Can the Health Care Unit be utilized as a resource allocator?" To answer this question, an interesting evaluation can be performed by reviewing the Health Care Unit's initial refinement study in which the hospitals were placed into peer groupings. This study computed Health Care Units for well over one hundred different military medical facilities with corresponding indices utilizing the data obtained for those facilities. The indices computed were for dollars per Health Care Unit, Health Care Units per physician, Full Time Equivalents, and operating beds. Exhibit XIII is provided to illustrate the wide ranges which occurred. The names of the hospitals involved are not provided, but rather the highest and lowest values which occurred in each indice. Thus this data can be used to illustrate the apparent vast differences in hospitals when using the Health Care Unit as an output element.

The highest and lowest values were not for the same hospitals, nor were the numerical values taken from one group

EXHIBIT III

Ranges of Indices for Category I Facilities

	Dollars/ HCU	HCU/ PHY	HCU/ FTE	HCU/ OB
Highest Value	1,394.55	696.74	53.97	329.7
Lowest Value	491.35	56.18	11.23	41.4

HCU = Health Care Unit

PHY = Physican

FTE = Full Time Equivalent

OB = Operating Beds

[Ref. 18]

of hospitals. It should be noted that the most extreme ou liers were discarded from the data. The ranges in each category appear to be extreme; however, the numerical valu of all hospitals fall within these boundaries rather propo tionately. Thus, to answer the original question on resou allocation, it would seem reasonable to assume that for allocation to take place at higher organizational levels, equation would be required that would utilize a weight for each individual hospital. It would thus appear that from the data presented, any attempt to utilize the Health Care Unit as a resource allocator would be an extremely difficu if not impossible, task.

Weights for the Health Care Unit are based on historic expenses of the inputs for each of the 25 performance fact

yet there are no standards established as to what these costs should be, i.e., what is the established cost of one aggregated inpatient bed day for a specific year? Is it considered reasonable for the average disposition from a Department of Defense facility to cost $1000 for a specific year while the average aggregated cost of the same disposition in a civilian hospital may only cost $750? Is it possible to establish standards to utilize the Health Care Unit as a productivity indice or should another system be designed which can make comparability of medical care efficiency a reality?

IV. PRODUCTIVITY AND PRODUCTIVITY MEASUREMENT FOR THE DEPARTMENT OF DEFENSE HEALTH CARE DELIVERY SYSTEM

A. DEPARTMENT OF DEFENSE PRODUCTIVITY MEASUREMENT AND PROGRAMS

The Federal Government now requires the Department of Defense to become efficient while maintaining acceptable levels of quality. This requirement is presently focused on cutting the size of the Department of Defense civilian workforce while future budgetary plans project a need for more civilian employees to achieve defined national security objectives. The anticipated increase in civilian workers is to be financed through savings yet to be realized from productivity improvements within DOD resulting from the Productivity Program's three important directional elements:

1. productivity measurement,
2. identification of new ways to improve productivity, and
3. provision of resources necessary to implement such opportunities.

All three program elements are brought together into one integrated approach to accomplish program overall objectives of productivity improvement and cost containment. Productivity measurement provides management the opportunity to observe efficiency of production. Any trend of change can be evaluated to determine why it happened. Measurement and evaluation will often reveal some areas of need or opportunities

for organizational and operational improvement. Once needs or opportunities for improvement have been identified, management can develop an approach for productivity improvement efforts and then commit management, capital, employees, and other resources to defined targets of realistic achievement.

After the Defense Productivity Program Office began requiring productivity measurement and the reporting of results to the Bureau of Labor and Statistics in 1973, the three military medical departments met in committee to evaluate traditional measures of activity and found them all to be "crude." Output measures then in use lacked definitional commonality and did not satisfactorily reflect the complex, multi-product nature of the output. The various output measures available were not even equivalent and could not be aggregated to proxy total output. A better proxy measure, the Composite Work Unit, was developed whihc is an aggregate of four product measures (admissions, live births, occupied bed days, and outpatient visits) adjusted to equivalency by weights. Chapter 2 discusses this measure and points many criticisms:

1. Resource requirements of the four elements of the output measure are probably not adequately reflected in current weights and resource-mix requirements for the inpatient stay duration may not be roughly three times the requirements for an outpatient visit,

2. The CWU does not recognize differences in service-mix for variances in case-mix intensity, complexity and duration and assumes that all four measures are respectively uniform and the service-mix requirements are more intense on the first day of inpatient

stay for the acutely ill; an average day for intensive care patients is quite different from that of the routine stay patient in terms of service-mix,

3. Quality of services variation from facility to facility is not recognized by the CWU and efforts to improve quality with more resources is negatively reflected in productivity unless volume is at least equivalently increased,

4. The result of holding the CWU's weights constant is unrecognized economies of scale, technology change, etc., over time,

5. Since the CWU/FTE index (output per employee year) expresses performance over time, it does not readily permit comparison of the absolute efficiency of one medical care entity to that of another of similar product and size,

6. The CWU/FTE index is a single factor productivity measure that cannot fully reflect changes in output caused by inputs other than labor, and

7. Because changes in output cannot be wholly explained by changes in labor input, the CWU/FTE index is not useful for management to separate differences in operational efficiency from differences in patient characteristics.

In summary, the CWU fails to provide valid, useful information to management and does not meaningfully aid in the identification of areas for potential productivity improvement. Even so, the CWU continues as the Medical Care function's output measure for input to the trend workload ratio representing trend change of effort or resource allocation as one of 41 general functional areas: Logistics, Personnel Training, Medical Care, Base Services, Comptroller, Manufacturing, Communications, and Physical Security, etc.

The HCU failed to gain acceptance after the Navy chose to "...nonconcur with the immediate implementation of the HCU

(in lieu of the CWU) to be used in the productivity ranking of both intra and inter Service military treatment facilities," because the "...improvement is negligible..." as the HCU is "...ineffective in assigning proper weights to illnesses according to the severity of illness and the requirement for medical resources. The further conclusion is that, due to the difference in case mix among military facilities and/or Services, and because of the inadequacy of both the HCU (as currently developed) and the CWU to properly adjust for such case mix differences, both indices are inappropriate for use in making intra and inter Service comparisons of productivity..." because it would "...signal inefficiency..." of the Military Health Services System [Ref. 27].

Review of BLS data shows that "from the base year of FY 1967 through 1978, Federal productivity for measured functions is reported to have risen by 17.4% with an average annual rate of +1.4%..." resulting from "...an average annual output rate increase of 1.3% with a -0.1% average annual rate of decrease in employee years." Department of Defense comparable figures reflect that productivity increased by 14.5 percent; outputs decreased by 3.2 percent; and employee year inputs decreased by 3.8 percent; all expressed in terms of average annual rates [Ref. 20].

Federal medical care productivity trends also increased over time [Ref. 31]. Contrary to Federal overall trends, the Medical Care Function for the Department of Defense

showed a 15 percent drop. Another report from the Naval Medical Data Service Center states that productivity for Navy hospitals in terms of workload, "...as measured by Composite Work Units...declined by 24.6 percent, while the number of employees...at Navy hospitals increased by 7.7 percent" [Ref. 22].

All productivity trends for the DOD Medical Care Function figures cited in both reports were considered questionable by the respective reports and lengthy qualifications were frequently offered in explanation for value trends reported. For example, the first report criticized the number of variables in the CWU (too few), and the inability of the unit to reflect change. This report also noted the decline of workload after the Vietnam War, technology change, overstaffing, policy change shortening the hospital average length of stay, shifts from inpatient to outpatient care, closure of facilities, Management Information System advances, etc., [Ref. 31].

Many expert observers were not surprised by these problems: Whippe and La Patra stated that "the productivity data submitted to BLS and used to construct productivity trends appears to be so flawed as to be useless without extensive analysis and qualification." The quality of productivity measurement was affected by major problems such as the suitability of output measures, output measure comprehensiveness, and the accuracy and usefulness of data. Further, the Army

and Navy lack real central control for manpower requirement statements; somewhat fail to use engineered staffing standards in management of manpower assignment; and permit abuse of staffing scheduling systems. DOD overemphasizes direct labor productivity measurement in lieu of total or partial factor measurement. Additionally, there is a need for increased attention to the possibility of total factor productivity measurement because output measures used for many, if not most, functions are really inputs or intermediate outputs subject to manipulation if tied to resource allocation. Accurate and consistent measures of output, whether direct or indirect, are of extremely high priority and crucial to any success in generating useful productivity data" [Ref. 21].

One other problem persisting within the productivity program's changing scope is the reliance on partial or single factor productivity measures such as the labor productivity ratio. Total resource allocation decisions are currently being influenced by measures at hand for lack of better information. Since the Department of Defense is increasingly being pressured by Congress and OMB to justify dollars requested based on organizational past performance, a holistic approach to productivity measurement would seem more reasonable. This belief is reinforced by comments in DODI 5010.34: "...Components which do not show productivity improvements or cannot support projections of productivity

changes shown in their budgetary estimates may find that both OMB and OSD will make alternative projections based on other factors such as new investment in plant and equipment or changes in workload" [Ref. 8].

If management's performance is to be judged on the basis of concrete evidence, the measure must provide relevant and valid information. The need to evaluate management, control and resource allocation requires that identifiable variables of the transformation process be described in quantitative values. Usually, such values measure the input and output quantities, and the productivity of the relationship of the output to the input. Therefore, inputs for the health care facility are usually measured (quantified) as manpower (dollars per hour), beds (dollars per bed), or in terms of total resource cost (labor, supplies, facilities, utilities, etc.). Output has almost always been measured in terms of dollars per patient day or output per unit of input. A different approach recognizes the patient as the most important input and counts the input as admissions or outpatient visits with output measured as patient days. Here, the productivity measure becomes average length of stay.

All such measures have been criticized for their failure to represent medical care facility and functional output. The CWU, HCU and comparable civilian equivalents also fail this effort as well. They all assume that patients, and the goods and/or services rendered the patients, are homogeneous,

yet cannot adequately account for organizational structural, process, technological differences or change or relate well to measures of output quality. Finally, the measures are not usable in that they fail to provide valid and accurate information for decision makers without gross qualification and explanation.

A better measure must consider or adjust for several affects:

1. The arrival of patients as admissions or outpatient visits to the medical facility generates workload,
2. Patient characteristics (demographics, disease, etc.) affect the amount of resources applied to the patient's needs,
3. Available resources as described in dollar terms to represent facilities, labor, supplies, utilities, etc.,
4. Organizational characteristics such as structure, policies, style of practice, size, capacity, etc., directly affect the process of patient care, and
5. Output quantity must be relatable to quality.

Such a measure would obtain the quantity and type of patients of type "n" disease distribution and the respective total cost in resources to produce the appropriate goods and services for quantity "q" outputs at a defined acceptable level of quality after adjustment for organizational characteristics.

Not satisfied with the results of the Federal Government's progress in productivity improvement and cost-containment efforts, the Office of Management and Budget did not question, to any serious degree, the validity of the measurement

methodologies. Instead, OMB sought another means of implementing control over Federal spending.

B. OFFICE OF MANAGEMENT AND BUDGET CIRCULAR A-76

President Carter's administration brought Zero-Based Budgeting (ZBB) to the Federal Government in 1976. Its importance of concept was complete per annum analytic organizational review from bottom to top; in essence, an evaluation of organizational budget based on worthiness of performance. This government-wide effort at cost containment slowly ground to a standstill because of the high costs resulting from intense time and resource demands at all levels of government.

The Commercial Activities Program was yet another attempt of the Federal Government to become more efficient and cut costs. This new opportunity for productivity improvement was presented in the Office of Management and Budget (OMB) Circular A-76, 1966 (Rev), "Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government" [Ref. 32]. Two directions for executive decree implemented by the circular include:

1. That any "government commercial or industrial activity ..." operated and provides a product or service that could be obtained from a private source... "should be provided by such sources if the services or industrial goods are available, if Federal performance is not mandated, and if in-house performance is not cheaper, and

2. That civilian sources usually are cheaper, that cost comparisons of private performance, and the "Most Efficient Organization" design's expected costs must be made based upon:

a. the same scope of work and the same level of performance,
b. established "performance work statements,"
c. standard cost factors, and
d. full costs whenever and wherever possible.

This program required a one-time organizational review designed to develop the "Most Efficient Organization" possible for in-house activities for comparison with civilian sector sources followed by regularly scheduled efficiency reviews.

Under considerable pressure to better define "Commercial Activity," OMB Circular No. A-76 stressed that the government should not start or conduct an activity or service of a commercial nature for its own purpose unless management clearly demonstrated that it was in its public interest to do so unless the function is specifically defined as a government function. Attachment A to OMB A-76 included some major Department of Defense health care activities as examples of commercial activities. Further guidance to ease governmental compliance with OMB A-76 was incorporated into the revised circular's supplement: Part II, "A Guide for Writing and Administering Performance Statements of Work for Service Contracts" (OFPP Pamphlet No. 4); Part II, "Management Study Guide," and Part V, "Cost Comparison Handbook." Later, DOD published its own guide, "DOD In-house Vs. Contract Commercial and Industrial Activities Cost Comparison Handbook," (DOD 4100.33h) which promulgated more detailed cost comparison guidance to DOD activities [Ref. 32].

OMB Circular A-76's initial guidance set forth the approach of, and requirement for, organizational review. It required that each Federal activity develop, implement, and report performance requirement standards and performance indicators suitable for use equally by the contracting organization for in-house use and also for the accomplishment of the same service under contract. All organizational commercial activities were required to be routinely reviewed to ensure that all aspects of the commercial activity were most efficient before the cost comparison was to be made. This review was to be accomplished utilizing management review and performance work statements techniques described in the appendices to OMB Circular A-76, Revised.

It is rather obvious that OMB Circular A-76 recognized that the competitive nature of the free market system is in itself a valid force for efficiency. This directive has resulted in increased contracting out of "Commercial Activities" (CA) previously performed by the workforce of the U.S. Government. Studies by the Rand Corporation and the Defense Audit Services confirmed the efficacy of the CA approach utilizing the performance work statement concept [Refs. 33,34]. Dr. Lawrence J. Korb, in his OSD Memorandum "Use of Performance Work Statements and Efficiency Reviews," dated 27 November 1981, cited success of the CA program for DOD: "as a result of such reviews, functions have been reorganized into more efficient operations. These reorganizations

not only eliminated over 600 jobs, but also about 40 percent of all functions studied since FY 1979 have been more economical to operate in-house than by contract" [Ref. 35]. A more recent Congressional Budget Office Report, "Contracting Out for Federal Support Services: Potential Savings and Budgetary Impacts," supports Dr. Korb's optimistic estimates, "...contracting out could shift some 165,000 jobs to the private sector, reducing total government costs in the first year by about 4 percent, or some $335 million. In outyears, however, the annual savings would grow to $870 million..." [Ref. 36].

Although Department of Defense medical treatment facilities have recently contracted out many non-health care delivery services, OMB A-76 has permitted the Secretaries of the three military services to exempt health care delivery services on request of the respective surgeon's general. For example, in 1982, the Department of Defense contracted out only $19.633 million for health services: $917,000.00 was for contracts let for services that were cheaper than government in-house sources; $694,000.00 was let for reasons other than cost; $170,000.00 was currently under contract but under review for cost-comparison; and $17.852 million was for services that had not been reviewed or approved [Ref. 37: II].

Examination of the range of percent values for manyears contracted out revealed that as these percent values increased, the activity function became less complex in nature.

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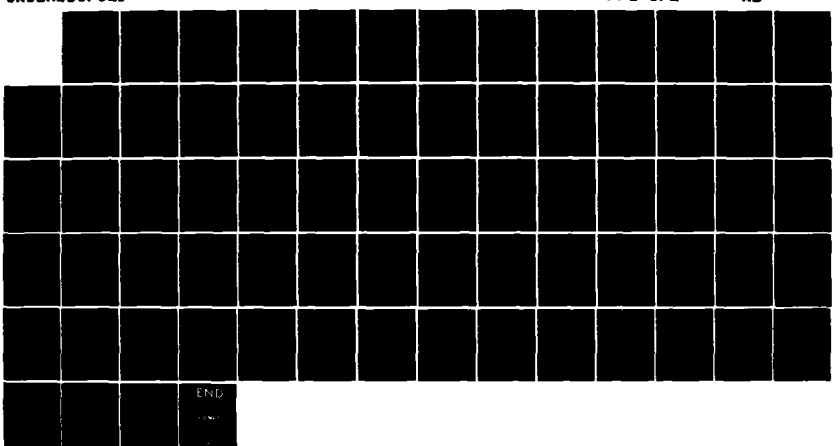

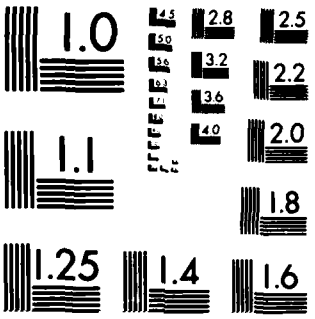

It is assumed that this trend reflects management's reluctance or difficulty to contract out activities that are complex in nature. For example, the DOD medical care function ranked lowest in manyears contracted out; only .8 percent, while less complex examples of this trend are reflected in the 100.00 percent manyears contracted out for Base Maintenance and 71.4 percent for products manufactured/fabricated in-house [Ref. 37: II].

The Medical Function is one of the few activity areas that also serves to represent structurally intact organizations or even commands that include clearly identified elements of some other defined functional areas. For example, a major medical facility has Logistics, Comptroller, Base Security, Food Service, Base Maintenance, Transportation, and many other functions as part of the command structure. If Medical Care is the major function of the command, it would be obvious that the commanding officer would be reluctant to contract the command's primary mission to civil sector sources. Under mandate to enact some degree of activity cost-comparison, it is also logical to assume that the commanding officer's choice will be one of the other functions not too interdependent with the mission's primary objectives.

In contrast to the above figures, civilian sector hospitals facing the pinch of prospective-payment cost-containment efforts of government and third-party insurance, are

venturing more and more into contract management shared services. Donald E.L. Johnson polled 74 Health Care Management Services contracting firms and reported: "...that the number of hospitals using one or more of their services rose 7.1% to 4,677 in 1982 from 4,367 in 1981." Individual contracts for such services increased by 16.7% for the same period. Another article by Linda Punch reported that total revenues will increase by $7.9 billion from $2.9 billion for the period 1981 to 1988 [Ref. 38: pp. 89-95; 39: p. 96].

Though studies also showed the CA program was a successful undertaking, the CA concept had problems and issues to address:

1. job security for Federal workers;
2. quality of services rendered;
3. the validity of standard cost-comparison values;
4. who decides which defined CA should be ruled exempt from contracting out;
5. short-term vs. long-term impacts on budget outlays, and
6. political, legislative, and regulatory restrictions on various aspects of the CA program.

Further, Dr. Korb estimated that for the next five year period (for reasons of national defense or that satisfactory private commercial sources were not available), only 20 percent of defined CA's would be subject to efficiency review under provisions of OMB Circular A-76. However, of this 20 percent, "about 60,000 spaces will be converted to more cost effective contract operations and efficiency reviews will

result in the reduction of another 2,400 spaces from more economical in-house activities." Some further action was warranted to bring the merits of the CA program to those activities considered exempt from OMB A-76's requirements [Ref. 35].

C. THE EFFICIENCY REVIEW PROGRAM

Although recognition of the success of the CA process was evident at high levels of the Federal Government, the Department of Defense became frustrated in its efforts to use the A-76 concepts and approach. As mentioned above, only 20 percent of those activities defined as CA were not exempt from the Circular's requirements.

In direct response to this problem, Dr. Korb's memorandum directed that all components of the Department of Defense develop a formal system of reviews for those activities not considered commercial activities [Ref. 35]. This directive was followed by another OASS (Manpower, Reserve Affairs and Logistics) memorandum which required that "...DOD components shall ensure that: an in-house Performance Work Statement (PWS) is developed with the procedures in OFPP Pamphlet No. 4 ("A Guide for Writing and Administering Performance Statements of Work for Service Contracts") to include a Performance Requirements Summary outlining all performance indicators, standards and accepted quality levels required of an activity. Further, a quality assurance measurement

plan is to be developed and implemented to permit demonstration of how effective and efficient a given activity is in meeting the performance standards and "...whatever method is used to conduct an efficiency review, it shall, at minimum, consist of analyzing the tasks or requirements outlined in the PWS" [Ref. 40]. "It should also include pricing out those tasks in terms of manhours, material, equipment and formulating an effective mix of staffing patterns" [Ref. 35].

Responding to this direction, Department of Defense Draft Instruction, 5010.XX, "Operational Improvement/Efficiency Reviews and Resource Determination," stated that "all activities (of DOD) are to be reviewed by the end of FY 87 and at least once every five years thereafter...labor standards will be updated every three years." Further, DOD components will "...allocate resources based on the most recent staffing or labor standards..." and shall be "...summarized to the resourcing level and used to justify requirements in the PPBS (Planning, Programming, and Budgeting System)..." in accordance with requirements of the OMB [Ref. 41].

The draft DODI 5010.XX required informal adaptation of the CA program's Performance Work Statement which "describes what work is to be done without stating how to do it. It identifies standards of performance to be met in measurable terms and defining the allowable variance from those standards." Briefly, the Performance Work Statement concept is a means to address an activity's functional work or task to be

accomplished in a format that describes the work and sets forth predefined standards of performance for quantity, quality and timeliness. The activity is then to be reviewed and compared against the Performance Work Statement [Ref. 41].

The three services promptly began implementation of the new program as directed. In 1984, the U.S. Army incorporated the Efficiency Review process into the "Army Performance Oriented Review and Standards" (APORS) program, which is managed by its Army Training and Doctrination Command (TRADOC) and is carried out by functional areas through major commands using regionally assigned teams of specialists from TRADOC [Ref. 42].

Following the emphasis of the instructional guidance, the scope of the program is chiefly oriented towards manpower needs. For FY's 84 through 89, TRADOC set a planned goal for jobs to be reduced of 154, 119, 119, 115, and 101 respectively. To make the program work effectively, the Army recognized the need to develop a close working relationship with major command and local level military and civilian position management and classification personnel. Savings generated from the APORS review was to be shared by TRADOC, 30 percent, and the major command, 70 percent [Ref. 42].

The Deputy Chief of Staff for Manpower and Personnel of the U.S. Air Force made the Efficiency Review process integral to their management engineering program and Efficiency

Reviews are now being conducted in some 20 functional areas; with over 350 potential functional areas to be reviewed by FY 1988. The Air Force is also emphasizing productivity-enhancing capital investment programs as an important part of the productivity program [Ref. 43: pp. 13-17].

The U.S. Marine Corps will concentrate its efforts in three key areas of focus, "...CA activities exempted from cost comparison, governmental research and development functions," and activity level training emphasizing all aspects of "...management improvement efforts, including efficiency reviews" [Ref. 43].

The U.S. Navy left its efforts in the area of efficiency review at the major command level to maintain maximum flexibility. Even so, the Navy planned to complete 20 percent of the functional areas identified in its inventory yearly for the five years [Ref. 43]. A Chief of Naval Operations Letter, "Efficiency Review (ER) Program," set a goal of 2 percent savings per year for manpower in functions reviewed [Ref. 44].

Although DODI 5010.XX sets forth direct and explicit guidance, it leaves many areas of interest open to service interpretation, adaptation, and further development. How this directive and its interpretation and implementation will influence the productivity evaluation and improvement of the Medical Care Function under the DOD Efficiency Review program needs to be the subject of further analysis and design.

D. ANALYSIS

The Department of Defense medical care delivery system is well-known for its assumed inefficiencies and ineffectiveness. The DOD Productivity Program and various other cost-containment efforts have failed to effect any satisfactory change in productivity trends or medical care delivery costs. Now DOD hopes to gain productivity improvements through use of the Efficiency Review process. The primary objective of Efficiency Review would be to identify activities of the Medical Care function that show potential for productivity improvement, develop and apply work performance statements containing performance standards "that clearly describe all work requirements in terms of what is to be done without prescribing how it is to be done," to eliminate unnecessary and inefficient work practices [Ref. 45]. ER is most successful in activity areas that are essentially well-defined and where tasks are easy to observe and measure. The major issue for analysis is whether or not Efficiency Review will prove practical and useful for application to the medical departments of the military services. The brief and subjective analysis that follows will attempt to demonstrate that inherent limitations of the ER process and the uniquely complex, poorly defined, nature of DOD's medical care inputs, transformation processes, outputs, and delivery system, when considered together, are formidable barriers to the success of ER applications within the Medical Care function of DOD.

As noted above in Section IV.C, this new program essentially focuses on manpower standardization, potential manpower reduction, and efficiencies in a functional, not organizational, approach to productivity improvement review when military medical organizations are essentially functional by nature. Additionally, examination of the ER process reveals several other general problems associated with the Efficiency Review program:

1. Most private industry is profit motivated. Techniques of organizational review will differ from civilian sector sources for purposes of adopting established and successful innovative analytical processes. A report cites two incidents where management engineering has resulted in savings in the millions of dollars for the Texas and New Jersey Hospital Associations; repaying the costs for the projects many time over. [Ref. 46: pp. 44-46]

2. Staffing standards in civil service and military positions must consider wartime standby requirements, career patterns and retention considerations. A doctor filling a pediatrics position in a military hospital may be military or civilian. If the person is on active duty, then the doctor is cadre staff for nonpediatric war-time duties and may even be filling the present billet as an O-6; under other conditions the job may only require a GS-13 or an O-3/4.

3. Most military activity improvement plans would require approval at a higher level of authority and may involve long lead-times for productivity improvement functional activity changes. For example, the services now require centralized purchase and service commonality for major equipment purchases. A piece of innovative equipment may do away with the need for a military position; but purchase requesting, budgeting, acquisition, etc.; and the reclassification of the job and transfer of the person are all lengthy processes that require higher authority approval.

4. Efficiency Reviews usually result in civil service and military personnel reductions and almost

always face political and managerial resistance unless positive or negative incentives exist to encourage the personnel change. Unless careful long-term planning and relocation efforts are a part of change, union and political interference are potentialities that may disrupt productivity improvements. For example, an officer's wives club became upset when a civilian nurse-practitioner was to be transferred as a result of subjective decision. Since there are poor standards developed for such staffing, the military hospital was not able to objectively justify the change to a local senator that was contacted by the wive's club and the nurse-practitioner remained in place. Many persons believed that this staff member used the medium of the wive's club to avoid transfer.

5. Private source management will usually encourage personnel at all levels of internal function to get involved in cost containment. Profit increases and other corporate rewards are shared to provide incentive for employee cooperation. Currently, the Federal Government offers little in the way of incentives for employee involvement in productivity improvement, with the exception of possible recognition with good performance evaluations. This, and personal satisfaction, often does not provide enough incentive to gain cooperative involvement in organizational change. For example, it is well known that civil service employees have inherent fears of "reduction in force" and view any new efforts of management to conduct personnel job analysis with jaundiced reluctance. Military managers are often reluctant to reduce contingency staffing. Success or failure of ER program effort hinges on support from the top down through all levels of the organization to be reviewed.

6. Unless Efficiency Review is integrated with service programs developed for manpower requirements determination and the CA program, the differing program approaches may result in wholly variant manpower figures for the same function. It is fairly obvious that efforts at manpower reduction and resultant savings could be duplicated with differing results if three programs examine the same functional area.

7. Governmental policy makers will want to require achievement of planned results. Currently, there are no established penalties for failure to meet targeted improvements.

8. Since ER program functional areas must collate with manpower developmental processes, areas where immediate change could improve productivity might go unnoticed. For example, medical treatment facility laboratory manpower standards have been under development for two years in the Navy. New technology could negate standards overnight.

9. ER program processes are especially suitable for tasks that are easily defined; whose inputs and products are identifiable and quantitative. Military medical treatment facilities have poorly defined products that are hard to quantify. No satisfactory measure exists to date.

10. Many noncombatant organizations of the Department of Defense are extremely dynamic in nature and are not suitable for evaluative efforts of the sort that utilize a base review/follow-up approach.

11. Compliance time frames for ER under draft DODI 5010.XX require the application of tremendous manyear resources to implement the review process across all functional areas every five years. Unless target dates are changed or more assets are made available for this purpose from higher than service levels, mission objectives, or other cost-containment efforts such as the CA program may suffer from lack of resources. [Ref.: DODI 5010.XX]

12. Paragraph A.2.c of Enclosure 3, DODI 5010.XX requires all CAs to develop PWSs in accordance with OFPP Pamphlet No. 4. The PWS must include a quality assurance plan and a performance requirement summary. Those functions without standard measurable output would have difficulty implementing such requirements. [Ref. 41]

13. OFPP Pamphlet No. 4 sets forth a formalized, highly structured methodology that is time and labor intensive in nature. Service-related and mission or geographical differences would make the ER process an expensive undertaking for many CA activities. Short-term losses may result from these expensive efforts. [Ref. 32]

14. Unexpected changes in weapon or other technologies often markedly impact on organizational or functional structure. Any ER would require a new base review for such changes.

15. Loose centralization of Efficiency Review control of three distinct and competitive services with major claimant levels making ER decisions may lead to unsuccessful communication of common standards, areas of improvement potentiality, and successful approaches undertaken.

16. Paragraph A.2.e of DODI 5010.XX's Enclosure 3 requires the "pricing of those tasks (those identified in the PWS) in terms of manhours, material, and equipment and formulating an effective mix of staffing patterns..." [Ref. 41]. This is poorly defined and taken literally would imply procedures very similar to cost-comparison efforts of the CA program. This effort would be time consuming, expensive, and stressing to those in the local workforce.

17. Paragraph A.2.g and h., of Enclosure 3, require that follow-up audits be conducted [Ref. 41]. Comprehensive audits similar to those required for CA cost-comparison studies would again engender huge costs that may over-shadow the usually expected 2-4% that could reasonably be expected from the ER of a functional activity.

The above criticisms are not intended to discredit the value of the ER process as a viable tool for making government more efficient. Rather, they are provided to give the reader some direction and feeling for the limitations of ER application to some functional areas that are as poorly defined, measured, and complex as the military medical delivery system.

However, assuming that the Medical Care function has been selected for ER, the appropriate decision maker would first assemble a team of about 6 to 8 persons. Two team members should be trained analysts; at least one member should be a representative of the respective major claimant, and the rest should be functionally expert workers that

have been through some related training--such as the Air Force Functional Review course on board the Kaesler Air Force Base in Biloxi, MS [Ref. 47: pp. I, I-2].

After the Medical Care area has been selected as a functional area to be reviewed and the team has assembled, the general approach would be the drafting of the Preliminary Efficiency Review Plan; the preparation of the ER Performance Work Statement; the ER Functional Analysis effort; and the development and submission of ER Study Report [Ref. 47]. During the phase of development of the Preliminary ER Plan, the team members will take advantage of every available source of information and expertise to become knowledgeable about the functional area to be reviewed. This will include the examination of regulations, organizational manuals, and the civilian literature. As necessary, trips to various sites will be undertaken to gain further data and knowledge [Ref. 47].

At that point an economic analysis is usually conducted by the ER team to identify specific activities or areas within the functional area offering the best chances for cost-containment savings. Currently, Congress is very interested in outpatient care delivery systems because of a Congressional Budget Office study that assumes outpatient services are over-utilized by non-active duty eligible beneficiaries. This assumption infers that beneficiaries arrive at the outpatient facility intentionally or

nonintentionally seeking services that are either unnecessary or should have been obtained elsewhere, presumably, because of the freedom of access that "free" care offers the non-active duty beneficiary. In other words, there are no financial barriers or negative incentives that preclude unnecessary utilization. The study does not explain how over-utilization was or can be demonstrated.

Therefore, it is logical that because of Congressional interest, an ER team might choose outpatient utilization as one aspect of the military delivery system that potentially could be improved by an ER process. Possibly, significant savings could be realized if this assumption is true and access can be controlled [Ref. 48: pp. I-43].

The first thing the ER team would want to know is why patients seek outpatient medical care: this is because the ER team would need to know what legitimate care is--to determine what should or should not be seen at the outpatient facility. There are many factors that explain patient service requirements for utilization of a medical care facility--too many to evaluate. However, Donabedian listed several important phenomena that indicate, and can represent, service-requiring potential: "1) people, 2) mortality or survival, 3) morbidity, 4) situations that require care, but which cannot be classified as morbidity or mortality, and, 5) health" [Ref. 14: p. 69].

People: until recently, DOD medical departments could only estimate the population and population demographics

that influenced the respective medical facility's resource and service allocation. A DOD, HEW, and OMB stressed that the patient demographics of beneficiary status, age, and sex are essential to evaluate utilization causation, and recommended that the Department of Defense develop a meaningful data base that could be used for resource planning, management, and allocation [Ref. 49: pp. 149-152].

A new source for obtaining the needed patient demographics data is the Defense Enrollment Eligiblity Reporting System (DEERS); a data base system designed to confirm just who is eligible for benefits provided by the Department of Defense and the Uniformed Services. The Uniformed Services include Army, Navy, Marine Corps, Air Force, Coast Guard, Commissioned Corps of the Public Health Service, and Commissioned Corps of the National Oceanic and Atmospheric Administration (NOAA). The Office of the Assistant Secretary of Defense (Health Affairs) and the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) at Congressional request instituted the system's development through contract by Vector Research Incorporated and Actuarial Research Corporation under a subcontract to Electronic Data Systems [Ref. 50: pp. D-1,2,3].

One of DEER's subpurposes was to develop and maintain capability within the data base to provide demographic data for populations eligible for access to the Uniformed Services Health Care Delivery System to include CHAMPUS,

the Civilian Health and Medical program for the U.S. Uniformed Services. The data base can publish a report similar to Exhibit XIV, listing beneficiary groups by age and sex for defined "catchment areas." A catchment area beneficiary estimate report for a medical treatment facility categorizes all beneficiaries living within the catchment area; which consists of all five-digit zip code areas within a 40-mile radius of the MTF for inpatient treatment considerations and a 20-mile zip coded radius for ambulatory medical treatment beneficiary estimates. Aggregate reports are available by service branch; by region, by states and those residing in the continental United States from those beneficiaries located overseas. Non-catchment area beneficiary estimates are also available by state and for the U.S.A. in total [Ref. 50].

Three hundred thirty-one military medical treatment facilities are listed in the data base. One hundred sixty-four of these are ambulatory care facilities. Thirty-seven MTFs are located overseas. Many MTFs have notably differing beneficiary, age, and sex mixes. For example, Naval Air Station, Keflavick, Iceland is virtually without retired and retired dependent beneficiaries while Naval Station, Subic Bay, Phillipines has over 52 percent in the same groupings. Others that are heavily active duty are typically skewed to the 18-24 year grouping [Ref. 50].

Currently there are problems with population identification that must be considered if the DEERS catchment area

EXHIBIT XIV

Patient Beneficiaries By Catchment Area

Age/Sex	Beneficiary Category: Active Duty	Dependents of Act Dty	Retired	Dependents of Retired	Survivors	Total
0-4 /M	0	573	0	42	0	615
5-14/M	0	820	0	488	12	1,320
15-17/M	0	120	0	444	14	578
18-24/M	2,430	68	6	589	22	3,115
25-34/M	1,530	16	51	11	1	1,609
35-44/M	443	3	416	2	0	864
45-64/M	16	2	2,430	5	1	2,454
65+ /M	0	2	674	4	1	681
0-4 /F	0	540	0	43	0	583
5-14/F	0	816	0	485	13	1,314
15-17/F	0	141	0	422	13	576
18-24/F	143	737	0	572	21	1,473
25-34/F	42	1,013	3	117	5	1,180
35-44/F	5	331	0	632	16	984
45-64/F	0	70	12	2,291	123	2,496
65+ /F	0	10	10	325	63	408
TOTAL	4,609	5,262	3,602	6,472	305	20,250

reports are to be used as the basis for patient demographic evaluation efforts:

1. The DEERS is still a relatively new development for the Department of Defense and the data collected to date is not error free,

2. Serious questions about the validity of input remain and analysis of this data would require careful authentication,

3. Patient demographics differ markedly from location to location,

4. Patients are generally free to seek outpatient care under CHAMPUS or civilian source without permission of the respective MTF,

5. Some inpatient care is also provided under CHAMPUS after authorization by the MTF,

6. Patients living outside MTF catchment areas are never required to seek care at the MTF,

7. Active duty and active duty beneficiaries are not likely to remain in one location very long, and

8. Satellite outpatient treatment demographics are included in parent MTF reports and are not available otherwise.

Many of these and other problems are currently under study for resolution. One popular proposal in Congress for consideration is the modification of the access pattern for MTFs by adoption of a "closed enrollment" approach. This entails registering all beneficiaries in either the MTF, CHAMPUS, or other programs. Under this concept, the medical care manager would know who would receive care at the facility historically, at present, and for the future.

Mortality or survival: mortality can be considered fatal morbidity. The need for knowledge of mortality rates in

utilization analysis is usually for purposes of adjustment to incidence rates of the population. The Department of Defense only collects information on those patients who die in military facilities. Some information is available from the other sources such as the DEERS. Local figures are usually not available.

Morbidity: Disease is obviously the most common reason beneficiaries make visits to military medical outpatient facilities. The measurement of incidence, or incidence rates, is the most important aspect of morbidity that concerns utilization measurement. However, the dimensions of disease complexity, duration, and intensity also are factors that influence how a person seeks aid for medical care needs.

Morbidity patient characteristics are different for each medical treatment facility catchment area, yet data on local morbidity patient characteristics are generally unavailable at the local level for the ER team's purposes. The nature of the diseases incident to the catchment area would be even harder to measure and adjust.

The marketplace is still investigating the problems of fitting a case-mix to the organization in a manner that minimizes methodology deficiencies. Lave and Lave discussed one approach to case partitioning that aggregates patients with similar cases into 17 broad Disease Related Groupings (DRGs) that defined case-mix in terms of the percentage of patients in each grouping [Ref. 51: pp. 293-305]. This

patient grouping methodology attempts to resolve the problem of defining the services (output) provided by a medical care facility in a clear, specific manner that is stable, manageable and useful. If the DRG is to accomplish this, it must represent patient care of various types and intensities for various periods of duration based on the unique needs of the patients the MTF treats. The classification must place the patients into a manageable number of classes that are representative of particular patterns of resource consumption that can be identified. This linkage of case-mix to resource-mix then is considered capable of producing a determinable cost-mix that permits a statistically stable distribution of resource use to the population served in a manner that suffices to establish a product definition for hospitals.

The "International Classification of Diseases Adapted for Use in the U.S." (ICD-9) is perhaps the most commonly used classification scheme for the DRG. Other similar classification approaches are available for use such as the "Hospital Adaption of ICD-9 (H-ICD). ICD-9 utilizes a coding system that has two distinct subsystems: disease entity classification and surgical procedure classification [Ref. 52: pp. 5-12].

Although all patients would be classified by disease, not all would have the need for surgical procedure identification. The 17 disease entities are further subdivided into 97 subclasses. A three-digit coding system (000-999)

permits even further elaboration. Today this coding scheme permits a total of 853 such classes of disease. Even further decimal definition is commonly in use. The surgical procedure groupings are subdivided into 8 secondary classes identified by a two digit coding that permits a current definition of 664 classes. Because sheer volume per classification would render any careful study beyond practicality, the DRG attempts an aggregation of values into larger groupings considered sufficiently related as to represent the enclosed set of more refined classification in hopes of acceptable homogeneity [Ref. 52].

An article by Harvey D. Doremus succinctly summarizes the benefits and limitations of the DRG. The benefits include:

1. DRGs are very useful for utilization review purposes on a regional basis,
2. DRGs can be used as standards in prospective reimbursement schemes,
3. DRGs can have a place in planning and budgeting,
4. DRGs can be used for efficiency measure elements for comparative purposes, and
5. DRGs can be used to develop patient profiles for health care resource scheduling.

Some limitations include:

1. DRGs have differences that are statistically important resulting from several attributes such as patient demographics, environment, resource-mix, structural policies, regulations and style of treatment patterns,
2. Current DRGs are not based on actual patient care costs but averages allocated on the basis of various indicators such as square foot per function,

3. The limitation on variables to be included is probably due to lack of availability of useful data,

4. Patient information (variable identification is subject to reliability limitations),

5. DRGs are influenced by time changes of resources,

6. Consumption so time values must be done at least yearly,

7. DRGs are affected by subjective judgements, and

8. To be valid, DRGs have to be regionally or locally developed to adequately reflect the uniqueness of the respective patient population. [Ref. 30]

Doremus outlines an approach to be used for development of a DRG-based case-mix cost data methodology:

1. Group hospitals by variables and geographic location,

2. Collect demoqraphic and clinical cost...data for a sample of patients for each hospital in a given group,

3. Group each patient into an appropriate DRG according to demographic and clinical attributes,

4. Calculate the average cost per patient for all patients grouped in a particular DRG, repeat this calculation for all DRGs,

5. Calculate the average cost per patient across all DRGs for all hospitals in the group,

6. For each hospital in the group, multiply the proportion of an individual hospital's patient population in a particular DRG times the average patient cost for that DRG,

7. Sum the results of all multiplications in #6 for each hospital separately, and

8. Compare the results of #'s 5 and 7...calculate an index number for that given hospital. [Ref. 30]

A search of the literature produced little mention of effort to develop Disease Related Groupings or Ambulatory

Care Groupings for outpatient visits. One rather obvious problem would be the identification of sufficient independent variables to properly classify the patient problem; further refine the class sufficiently to allow for intensity and complexity, duration of problem, etc.; and permit clear resource allocation patterns in a similar assembly of variables to the DRG's variables.

The three military medical departments are now individually evaluating the possibility of adopting the DRG to internal planning purposes. For example, a paper published by the Research Department, Naval School of Health Sciences, describes their successful use of the DRGs replacements of the ICD-9 coding scheme using the AUTOGRP Patient Classification Scheme [Refs. 52,53].

Situations that require care but are not properly defined by morbidity or mortality indices: roughly one-half of all beneficiaries visit clinics for reasons other than disease, and sometimes, the real reason is not apparent. The hypochondriac is a well-known phenomenon; but other reasons include administrative paper work and preventative care such as prenatal, obstetrical, well-baby, and social counseling. For the active duty beneficiary, required physical examinations for various mission-related purposes are an important reason for patient visitation. For example, an enlisted person may be required to see a doctor for a flight physical, a government vehicle driving permit, a special equipment

operator's permit, a foodhandler's permit, etc. It is possible that the active duty beneficiary might require some or all of these examinations.

Health status: There are many definitions of health. Some attempt to isolate disease from other factors of health. Others measure health in observable, quantitative, ways such as the number of days lost from work for a given period. Again, military sources have little or no data collection methodology that defines or reflects the health status of a catchment population.

The previous discussion of Donabedian's service-requiring factors presents some aspects of the difficulty of quantification of just one parameter of just one determinant of just one complexity of the DOD Medical Care Delivery System--utilization. The ER team must determine what comparative standards will prove or disprove this statement. The differences of locale, population, structure, policy, etc., make this issue extremely hard to quantify or even to put in subjectively comparable terms. As well, a point of reference must exist if comparisons are to be made. No one to date has demonstrated that military care utilization rates can fully be made comparable with data gathered from civilian sector sources. Even after adjustments, the issue is whether or not utilization rates should be close to those of civilian sector beneficiaries. Even if the difficulties of identification of acceptable standards are overcome and assessment is

possible, the ER team must consider interdependent issues. Given that beneficiaries over-utilize outpatient medical care facilities, how can over-utilization be discouraged but avoid affecting legitimate usage? How can control devices such as a "nuisance fee" in a system that now offers essentially free outpatient care avoid harm to those in need of care that would stay away because of the fee? What would the presence of the fee do to the morale and retention of the active duty beneficiary who is accustomed to the present health benefit package?

Due to constraints of length and purpose, not all aspects of the utilization issue have been discussed and/or analyzed nor have those topics addressed been analyzed in depth. The scope of the above discussion was intended to provide the reader with some understanding of how assessment of even one narrow issue related to the complexities of health care delivery in the military is beyond the ability of a task force dedicated to short-term, informal, investigation and resolution of inefficiencies. The nature of ER is to identify the common, find standards of quantity and quality applicable to the functional area group and induce group-like behavior in the individual element to gain overall savings. The nature of the military medical care system is that it is different--variant across lines and levels in complex, interdependent patterns that vary over time, distance, patient populations, staffing, facilities, etc. The military medical delivery

system has unique characteristics that complicate any measurement of medical care efficiency and effectiveness; even more so than the civilian sector. Few military or civilian medical care delivery systems or facilities can accurately measure or forecast the volume or case-mix that determines patient demand of resources and services that go into the products of the facility. There are too many variables and too many questions. Decisions of policy may harm or help the facility or the system; the patient or the group; the group or the population.

The conclusion is that an effort to resolve all of these and other problems through the ER process will generally minimize this avenue of cost-containment as an overall approach to medical care delivery facilities as an effective methodology to gain efficiency and cost-containment when applied to specifically health care functional activities. In some instances, this generalization will, of course, not be realistic. Successful efficiency review for specific and well defined activities should prove an effective device to gain efficiency.

If the Medical Care function is considered inefficient and ineffective, before decisions are made to attempt reform through Efficiency Review, an essential question must be asked, "How inefficient and ineffective is this function and just how efficient and effective should it be?" Chapters II and III attempt to demonstrate that past measurement

efforts did not succeed in answering this question. Whether or not the military medical care delivery system wants the question answered, the Federal Government apparently is going to pursue this question through means of the ER process. Certainly, the medical care delivery system has not been considered excempt from this program.

The military beneficiary is not demographically the same as the civilian counterpart and uncertainty of numbers, locations, eligibility, health status, sex, age and personality influence any attempt to quantify the patient-mix that will arrive at the treatment facility within a given period. To date, few military or civilian facilities can accurately forecast or plan for the mix of patient demands and resources that are needed to service the patient. Of course, if the clinic is seeing patients at or near an undefinable capacity, scheduling is merely denial of access. So the problem is the determination of the share of the approximate population that can be provided care most economically. The above and following factors directly influence this evaluation: physical facility capacity, personnel staffing and availability constraints, actual total care utilization of the defined population, other source costs, military standby and manpower training requirements, and other constraints of resource availability [Ref. 49: pp. 997-998]. Because of Congressional and Federal decree, the Department of Defense has attempted to resolve some of the problems of patient

demographics identification. To gain some understanding of the complexity of accomplishing even a rudimentary ER of this activity, some information must be provided the reader. A typical outpatient clinic may be physically separated from its parent inpatient facility. A staff of 3-5 physicians, 2-3 physician's assistants and/or nurse practitioners, and 28-35 other supportive staff may serve a daily patient count of about 125-185 patients. About 50-70 of these will be active duty patients seen on a first-come, first-serve basis in a "sick-call" mode. Retired beneficiaries dependents are usually seen by appointment. Ancillary diagnostic and treatment services typically include a laboratory, radiology, pharmacy, treatment and/or minor emergency room, etc. The staff will be a mix of military officers and enlisted, civil service, and contract service personnel such as janitors and medical repair technicians.

For purposes of this discussion, an organizational approach is considered rather than just examination of manpower characteristics. First, it is understood that information collected must be accurate, relatable and valid; a notorious problem with the entire medical care delivery system. It is reasonable to assume that local level data collection methods and responses can be sampled for utility within the scope of the ER.

As mentioned before, certain tasks, activities, functions, and jobs are easily evaluated using management engineering,

time study, or techniques. A few personnel such as supply clerks, typists, receptionists, appointment clerks fit this circumstance. However, assuming the local command civilian personnel office is also required to be reasonably efficient, most jobs that are easily measurable have already been evaluated on a routine basis for task definition, job classification, etc. It is reasonable to assume that no significant savings would result from evaluating these individual positions. The personnel that offer the most potential for cost-saving analysis are also the more expensive personnel that make the most decisions; carry out the most non-routine tasks; and utilize the most additional resources. This group of personnel includes the physicians, the nurses, the physician's assistants, and other skilled personnel such as laboratory and radiology technicians. Even senior, professionally and technically expert physicians are reluctant to audit peer efficiency and effectiveness; especially the more subjective decisions and actions of their peers.

Since overutilization of the facility's services is presumed, the patient and the physician are usually considered the primary agents of this inefficiency. Although non-active duty beneficiaries have the freedom of choice of seeking care elsewhere, under CHAMPUS, through private plans, or even out-of-pocket; this problem is not considered because the stated objective is to determine the utilization legitimacy

of those beneficiaries who do seek care at the military treatment facility.

Another problem confronting those analysts tasked with conducting an ER on the above mentioned outpatient clinic is the reason patients come seeking service(s) at military treatment facilities. The above cited DOD Health Care Study published in 1975 stated that "while disease is the most common reason for both active duty and nonactive duty beneficiary visits in military facilities," it accounts for more than half of nonactive duty visits (62 percent) and less than one-half of active duty visits (48 percent) [Ref. 49: p. 602]. It is logical to assume that some means of control exists to make decisions on utilization need, whether or not control is effective. In this case, it is obviously the practitioner who most controls decisions on patient conditions. The Health Care Study states that "...Physicians made disposition for roughtly 70 percent of all visits," and supervised dispositions on about 20 percent of all other visits [Ref. 49: p. 602]. To properly understand whether or not potential improvements in patient utility can be made, the ER analyst would have to be able to define the more important characteristics that influence resource utilization in the outpatient treatment facility. There are primarily two major considerations here: patient service requirements as seen by the individual patient and as seen by the practitioner; and physician characteristics that influence disposition decisions.

First, the nature of health status must be understood. This is a very difficult and complex undertaking inherently complicated by lack of standard definitional input. Many researchers have unsuccessfully tried to make the difficult simply by applying various measures to health status. It is not purposeful to describe the approaches most likely to be useful to the analyst. Typical of those potentially useful to the ER analyst would be utilization rates, workdays lost rates, and morbidity and mortality rates. These figures are rarely available for local facilities who report periodic data for central compilation. Currently a data base has been established to utilize the DEERS to develop local utilization rates and other useful planning data. Although sufficient data has yet to be inserted into the data base, the Resource Analysis and Planning Study (RAPS) Decision Support System model has great promise for the future [Ref. 50].

Certainly, knowledge of morbidity in the captive population would benefit the ER analyst to ascertain the complexity of outpatient visit patterns for the "typical outpatient clinic." But the number of potential classifications are voluminous. The purpose of getting such information together is to aid in the identification of the output produced and the resources and services required to satisfy reasons for the respective patient's outpatient visits. There are problems in output and related resource allocation identification.

Since definition of the MTFs product or goods and services has been difficult, most practical managers avoided examination of the complex mix of resource, process or transformation and service in favor of traditional single value representation of medical care such as outpatient visit or patient day (period average length of stay times period patient (admissions + live births)) counts. Lave and Lave are typical of the literature when they label such measures as "crude," and advocate the measurement of output on the basis of case-mix adjusted patient visit or patient day [Ref. 51]. Berki and others also advocated such adjustment to the patient visit or patient day output measure [Ref. 54: p. 34].

Once patient characteristics are identified, the ER analyst would be interested in practitioner characteristics that are influential to the patient disposition process. Facility size, and the number and type of services and resources available to the physician are of obvious influence. Constraints on the physician, age, specialty, environment, health, source of education, experience, and personality are the more important personal practitioner influences.

DODI 5010.XX and other directives require that the ER process must make sure that the activity being analyzed currently has acceptable quality standards and that output must meet those standards. To date, the military services have progressively instituted peer and utilization review standards, professional and credentialing standards, patient profile

standards, facility and personnel standards, safety standards, etc. The problem is identification, implementation, and, especially, acceptance and utilization. There are strong efforts at inter-service standards consistency being made today.

If the ER analysis can struggle through the maze of information needed to identify the patient and practitioner characteristics. If the information is accurate and available, and if the analyst is able to measure all of this data, the analyst must now venture into examination of the physical aspects of the facility and its relationship with its population, internal organization, staffing, and higher command structure. Recall that DODI 5010.XX and other pertinent directives discussed above require a costing of activities being evaluated. Appendix A to this thesis describes the current cost accounting system adopted by the three military medical departments: The Uniform Chart of Accounts. This methodology provides the military medical care delivery system with a consistnent cost reporting tool that provides information about costs that previously was not accurate nor available in many instances. There are problems in using this data. The information is not relatable to the individual patient directly and provides average costs per unit that are stepped down through several layers of allocation based on workload indicators. The information is typically six months old. Since the reporting system is fairly new, there are some

managers who question the validity of the information they see. There are no requirements for using this information for purposes of management control. The "typical" outpatient clinic's cost picture is buried in aggregated accounts that make tracing relatable costs difficult.

And there are other cost identification problems. Any attempt to define costs must "...consider in some manner the contingency (standby) capability also provided (at least in part) by these same resources (MTFs) [Ref. 49: p. 999]. If a true cost of medical care is to be comparable, the standby cost of facility, staffing, and equipment must be considered. Are the costs measurable in terms of cost to the government, cost to the government and beneficiary, cost to the government and the beneficiary population, the society, etc? Are the costs of the beneficiary under CHAMPUS, third party insurance, and from out-of-pocket to be considered? What is the relationship of the outpatient costs and the parent inpatient facility? These and other issues remain unresolved today.

E. A SUGGESTED PRODUCTIVITY MEASURE

Foregoing portions of this chapter offer the reader some understanding of recent Federal and Department of Defense efforts to make government more efficient and to cut costs. OMB Circular No. A-76 has been declared a successful process that will eventually address some 20 percent of all Department

of Defense organizational entities. The military health services system, allegedly one of the Department's least efficient functional areas, is not likely to be a serious candidate for comprehensive application of cost-comparison and contracting requirements of the CA program. Efficiency Review, as a program and process, applies many of OMB Circular No. A-76's best techniques to functional areas of the Department of Defense that are not evaluated under the CA program approach. Subsequently, this chapter has attempted to demonstrate that the ER process, when applied to the complexities of the military health care delivery system, will face quantitatively immeasurable areas of function that are probably beyond the methodology, time constraints, cost-benefit parameters, and scope of the ER process.

Further, the important problem is performance measurement. Before any productivity improvement decisions are made, performance measurement should evaluate the actual situation. Usually, organizational performance is observed, measured, and reported to management as an integral part of a management control system. Management's reason for bearing the expense and effort of such measurement is to gain knowledge about the given cost center's efficiency of limited resource allocation to a planned service or process transformation intended to result in desired quantities of product at an economically acceptable quality. This information augments the decision maker's understanding of the cost center's

efforts so that objective rewards and penalties can be awarded, and when efficiency is lower than it should be, take corrective actions designed to make the medical care delivery system more productive and less expensive to operate. Managers at all levels of medical care delivery within the Department of Defense need information that is tailored to the specific scope of decision processes. Chapters II and III have attempted to demonstrate that the current and proposed military health services system performance measures are not the answer to this need.

This discussion will now summarize a few relevant performance measures and then propose a methodology that incorporates dimensions of the medical care delivery systems' inputs, transformation process, and outputs through selected and adjusted variables using a modification of the traditional output/input productivity ratio.

One major problem all along with the military medical care delivery system's measurement of productivity has been the development of a common measure and a defined base of comparison or reference point. Clinic A, of gender "apple," generally fails to adequately compare with Clinic B, of gender "orange," in the measurement of type k products (1,2,...,n), using inputs of type r (1,2,...,n). In other words, proxy measures in the past have failed to fairly represent inputs, transformation processes, and render these measures comparable against some base of reference. Chapters

II and III provide reasons for this failure of present methodology and measures.

Most measurement methodologies incorporate the average cost of some relative proxy measure of output such as occupied bed day, the length of stay, or outpatient visit and have required adjustment to compensate for the difficulties of medical care product or output identification; adjustment for the poor relationship of average cost per resource summed over quantity and type of output; and adjustment for equalization of measure terms. This traditional hospital cost index has been tried in a variety of forms with limited success.

There are several generally accepted guidelines that should be noted:

1. The methodology and the measure should avoid perverse or negative incentives for the entity measured,
2. The measure should avoid manipulative potential of the input variables by interested parties,
3. The measure should rely on inputs that are available, easy to identify and representative of the actual inputs that go into the transformation process of the entity and result in the entity's products,
4. The measure should be relatively simple to implement, use, and understand,
5. The measure should produce results that are single valued and understandable,
6. The measure should incorporate a methodology that is inexpensive and not labor intensive,
7. The input process should eliminate as much of the subjective as is possible, and
8. The efficiency measure should avoid any reference to quality of performance.

To be useful for resource planning, budgeting, and management, the measure should associate costs with performance. There are several such relationships in common usage: a) cost per population; b) cost per output; and c) cost/percentage relationships. Practical and historical reasons seem to indicate that any measure developed probably should reflect a cost per beneficiary or cost per patient episode.

A cost per beneficiary relationship within the measure has several advantages:

1. The results have commonality that avoids the differences of service measures such as outpatient visits, occupied bed days, hours of service, etc., and does not have to consider the types of outpatient visits or surgical vice medical occupied bed days,
2. This variable is not easily manipulated by the activity measured, and
3. A cost per beneficiary measure avoids perverse or negative incentives because of #2.

A cost per beneficiary feature of a measure would also have associative negative considerations:

1. This variable does not entirely explain all the factors which influence or drive the demand for care and the cost variable, and
2. A cost per output inclusion in the measure would suffer the disadvantage of too many surrogate labels for difficult to define outputs and have few of the advantages of the cost per beneficiary.

Each measure has its own limitations and advantages for the service provided. Most measures of medical care productivity restrict the inclusion of surrogate output labels to cost per occupied bed day or outpatient product to represent all other products associated with the organization. Of

course, both are proxy or approximate representations of aggregate output, assuming homogeneity of the product and heterogeneity of the patient. Both representations of product may be manipulated by concerned parties to the benefit of the measured entity. Inclusion of other service output cost per service elements also permits organizational manipulation and perverse results.

A cost/percentage relationship can be considered the relationship of two costs; one to another. These ratios are exemplified by those in the Uniform Chart of Accounts. They are useful to point out relationship changes over time for specific activities or functions. These ratios are useful to identify abnormalities but should be specifically related to what they are intended to measure.

Efficiency Review program directives stress the need for relating the measurement, evaluation, and analysis of productivity to some incentive scheme that induces efficiency. An ideal measure would itself contain an incentive for efficiency and express the value determined in a manner that permits observation of actual cost per unit of product proxy.

If made common by DOD requirements, certain conditions would greatly improve representation of MTF productivity by proxy measures:

1. Uniformity of MTF data and definitions of variables/ characteristics,
2. Uniformity of most MTF policies,

3. Uniformity of cost center definition, full cost identification, and recognition,

4. Uniformity of non-direct patient care cost isolation,

5. Uniformity of full cost transfer-pricing methodology, and

6. Uniformity and capability to trace costs to actual groupings of patients receiving services (DRGs).

For lack of a better scheme, medical facilities are usually grouped on the basis of classifying facilities by certain variables that are intended to bring homogeneity to groupings. Typical variables included for linear regression or cluster analysis are size of hospitals by number of beds, number of services offered, types of services offered, number of in-house teaching of residency programs, number of admissions, etc. This methodology is called peer grouping.

The Uniform Chart of Accounts divides medical treatment facilities into "activity" groups using size, expense, and to some extent, facility mission. Historically, the services have subjectively grouped all such facilities into three levels:

1. Primary--primary care is offered in a defined general pattern of care considered basic to all hospitals,

2. Secondary--these facilities offer a higher level of specialized care and have the capability to handle a more complex load of patients, and

3. Tertiary--the services designate major regional or national medical centers as tertiary care centers. This level of MTF provides the most complete care available and usually are resident and specialty training centers. [Ref. 25]

Although based on historic data from the UCA, grouping of facilities is currently based on subjective observation and with collective consultation from the military medical departments. It should be noted that changing a facility from one grouping to another significantly affects workload weighting. The process of grouping peers must, therefore, be as objective as possible, remaining neutrally fair. It is important that such decisions be made at the highest level of common interest; the Office of the Assistant Secretary of Defense (Health Affairs). The current preferred methodology for classification of medical facilities into peer groupings by the literature is polyethetic clustering analysis. This is the recommended approach for the proposed measure of this thesis. A good explanation for this technique is presented by Phillip and Iyer [Ref. 55: pp. 126-151].

The development of the proposed basic performance indicator begins with consideration of the traditional productivity index:

$$\frac{\text{outputs}}{\text{inputs}} .$$

For example, this measure might compare pounds of laundry produced with labor manhours utilized.

Previous discussion has established the need for a point of reference--the standard. The selection of one basic standard selected for this proposal is:

$$\frac{\text{actual amounts of output}}{\text{expected amounts of output}}$$

This ratio compares, for example, the actual pounds of laundry processed with a standard of accomplishment expressed in the same terms. The model permits comparative efforts over time and across similar health services system facilities and yields a value of one for performance of any MTF efficient enough to achieve the expected. Inefficient variance yields a value of less than one, and, of course, the converse is true for the facility exceeding their expected efficiency.

A slight modification of this model produces:

$$\frac{\text{total facility period costs}}{\text{expected facility utilization}} .$$

This model relates the actual total period costs of a specified facility to the expected facility utilization and produces a numerical value that is an average cost per expected beneficiary utilization of the measured facility for either outpatient or inpatient values that is meaningful and useful to the decision maker. For example, the measure might compare actual cost of direct patient care to expected facility utilization for two similar outpatient clinics.

The measure incorporates four elements of data:

1. Period facility total adjusted costs,
2. Beneficiary groupings for demographic representation,
3. Incidence rates of expected utilization, and

4. An adjustment factor for intensity of services that would be rendered to suit the facility's incidence complexity.

The development of the proposed performance indicator (I) begins with:

Step 1

Let:

$$I = C'/\hat{U}'$$

where:

C' = adjusted total costs, and

$\hat{U}'$ = expected adjusted total utilization.

Step 2

Let:

$$C' = \sum C_i$$

where:

C_i = total (adjusted as necessary) costs of category i.

The total cost data element is to be obtained from the internal respective sources that generate actual costs related to the above single event occurrence. To reduce variance, each unit price can be standardized for the period. For example, standardize the labor cost by using the averaged billet cost

for each of the billets assigned to the medical facility and multiply this value by the number actually assigned to the billet at the medical facility. Energy costs can be standardized by using a geographically common unit of measure such as the price per kilowatt hour. The measure should avoid inclusion of cost elements not controllable and not direct patient care for local health care delivery cost centers. Typically, because of complexity, actual cost elements might be represented, in proxy, by the following cost elements: labor, material, equipment, energy, and overhead.

Step 3

Let:

$$\hat{U}' = \sum \hat{U}'_j$$

where:

$\hat{U}'_j$ = expected adjusted utilization by class j beneficiaries.

Step 4

Let:

$$\hat{U}'_j = B_j \ (A_j)$$

where:

B_j = number of beneficiaries in category j and j = 1,2,...,m,

m = 1,2,...,80, and

A_j = vector of adjusted incidence rates associated with beneficiary class j.

The grouping together of beneficiaries in a defined population is by attributes in common. Therefore, they can be classified with respect to these attributes. For this classification to be efficient, it must be based on criteria which clearly separate one group of the population from the other, reducing the number of possible attributes to those number of attributes which can be clearly separate, one from the other, in the population. Next, the attributes or characteristics should be common to many populations, or all defined populations. These basic and essential characteristics have almost universally been income, age, and sex of a person. As previously mentioned, the DEERS provides this data in a manner suitable for use in the proposed measure. There are five defined groupings of beneficiaries in common use by DEERS:

1. active duty personnel,
2. active duty dependents,
3. retired personnel,
4. retired dependents, and
5. survivors of active duty and retired sponsors.

Each of these groupings can be related to income by subdividing them into enlisted and officer groupings and finally to rank groupings.

The age groupings include:

1. 00 to 04,
2. 05 to 14,
3. 15 to 17,
4. 18 to 24,
5. 25 to 34,
6. 35 to 44,
7. 45 to 64, and
8. 65.

And, of course, DEERS recognizes the sex type as male/female.

Exhibit XV provides data on beneficiary groupings as of 1 July 1983. The figures represent those beneficiary groupings within catchment areas of a 40 mile radius and do not include all beneficiaries residing in the continental United States [Ref. 56].

Step 5

Let:

$$A_j = (\alpha_{j1}A_{j1}, \alpha_{j2}A_{j2}, \ldots, \alpha_{jk}A_{jk})$$

where:

α_{jk} = the adjustment factor for incidence rate A_{jk} based on resource requirement intensity, and

A_{jk} = the incidence rate for (visit) care type k for population/beneficiary class j.

EXHIBIT XV

Beneficiaries By Catchment Area

Beneficiary Category

Age/Sex	Active Duty	Dependents of Act Dty	Retired	Dependents of Retired	Survivors	Total
0-4 /M	0	218,832	0	12,726	129	231,687
5-14/M	0	319,064	0	129,987	4,842	453,893
15-17/M	0	59,494	0	119,644	5,878	185,016
18-24/M	720,172	43,000	2,681	153,990	9,019	928,862
25-34/M	448,427	13,505	18,481	2,496	305	483,214
35-44/M	218,013	2,304	115,739	504	89	336,649
45-64/M	20,108	1,273	628,506	1,361	315	651,563
65+ /M	0	428	168,926	881	225	170,460
0-4 /F	0	209,822	0	12,931	165	222,918
5-14/F	0	313,092	0	130,819	5,151	449,062
15-17/F	0	64,932	0	113,158	5,221	183,311
18-24/F	89,860	277,870	179	150,407	8,814	527,130
25-34/F	42,580	345,587	686	36,444	1,862	427,159
35-44/F	3,903	147,936	641	181,286	6,434	340,200
45-64/F	716	32,633	5,969	592,135	50,834	682,287
65+ /F	0	2,953	4,741	78,152	25,989	111,835
TOTAL	1,543,779	2,052,725	946,549	1,716,921	125,272	6,385,246

The incidence rate adjustment factor reflects the intensity of resource allocation necessary for a given incidence rate of a specified event. Adjustment factors can be adapted from reference sources--such as the California Relative Value Studies or they can be developed. This should be accomplished at the level common to the peer grouping or on a regional basis [Ref. 57]. The incidence of an event is usually considered to be a dynamic analysis or what is the incidence rate for a period. The basic formula for a given event class is:

$$\frac{\text{number of events that occur during a time period}}{\text{population exposed to event risk for the period}} .$$

Usually this rate is multiplied by 1000 to put the value in terms of events per thousand. For the proposed measure, this event could be dispositions of inpatient or outpatient case; occupied bed day or outpatient visit. As well, the event class could be further subdivided into more specific rates such as the number of first arrival outpatient visits. The morbidity and mortality rates published by the three military services are other examples of common incidence rates used to measure populations of the MTF. For purposes of this thesis, the use of DRGs appears most promising as a representation of utilization in a performance measure.

V. SUMMARY AND REMARKS

A. SUMMARY

Chapter I pointed out the requirement and need for productivity measurement within the Department of Defense and discussed the apparent inefficiency of the military health services system as measured by the current performance indicator. This negative observation, and subjective public and political opinion, places the military health care delivery system's future at risk because of current higher level directives and instructions that tie resource allocation and policy or structural decision making to productivity improvement and cost containment efforts. The key issue is whether or not the current productivity measure, the Composite Work Unit, truly represents the actual productivity trend of the health care delivery system. If it does not, is productivity above or below the recorded trend?

Chapter II addresses the Composite Work Unit and, after analysis, concluded that for many reasons, the measure is not really portraying the productivity of the health services system; and, in fact, may be underestimating actual performance by a significant variance. Certain aspects of the measure drive workload counts down as efficient effort is accomplished.

Chapter III examined the Health Care Composite Unit, or Health Care Unit, and concluded that this measure is also

ineffective and inadequate for measurement of productivity for health services system efforts. Adjustments to the HCU produced consistently wide differences of productivity for peer grouping hospitals in test results.

Chapter IV reviewed the findings of Chapters II and III, and concluded that the health services system of the Department of Defense continues to report productivity trends to the BLS in the form of CWUs/manyears of employment and that results reported were qualified and elaborated upon until the measure itself produced no meaningful representation of the system's efficiency status. Some root problems of the health care delivery system, regarding its assumed current productivity level, are the readily observable inadequacy of the productivity measure and the lack of adequate incentives to encourage the system's decision makers to be more efficient and cost conscious.

Further, the chapter described two new and important productivity improvement approaches of government; OMC Circular No. A-76's Commercial Activities program and the DOD Efficiency Review program. Because of the regulatory exemption clause of A-76, and public and political sensitivity, the Commercial Activity Program will apparently have little impact on the health services system as a whole. Isolated instances of success for health care service contracting out have been reported, however, and the program is newly implemented with little historical perspective to rely upon for example.

The Efficiency Review process was subsequently incorporated into the DOD Productivity Program as the Efficiency Review Program for application to those Department of Defense components and activities not covered under requirements of A-76. This chapter concluded that, although the program was new and not yet in use for health services system functional activities, its future potential for application to, and productivity improvement of, the system is not significant. Consideration of complex interdependencies and resultant indirect effects of change are logical requirements for the ER process, but many aspects of the system may be difficult to assess within the ER approach framework. This statement is not intended to imply that the program's future for Department of Defense productivity improvement and cost containment through ER will be less than intended; rather, that the program will have an increasingly defined role in the Productivity Program where few areas of professional health care activity exist that Efficiency Review can properly evaluate.

For health care functional areas that quantitative and objective methodologies of productivity measurement can meaningfully evaluate, Efficiency Review may become a valuable tool for health care delivery management in the Department of Defense. For example, some activities recommended for ER study include patient affairs, food services, medical records, and medical supply activities.

While no hospital or medical clinic remains free from complaints, all MTFs gain positive or negative reputations. Inefficiencies that are noticeable are quickly identified by internal review process or through external inspection and are subsequently corrected. However, inefficiencies that are noticed by patients are usually more subtle. The external nature of the ER process enables activity observation from a fresh and different stance. Productivity efforts can be most fruitful in health care areas through job enrichment philosophies, workforce motivation studies and programs, and organizational development.

While the CA program has the spectre of civilian contract competition and external audit certification to instill incentive for development of meaningful command MEO statements, the ER program depends on organizational support at all levels, from top down, for its success. It is very easy for management to view ER as just one more mechanism to justify personnel reduction. The ER program alone without external control leaves management sufficient freedom to generate a PWS and MEO based on "present state" operations with a token 2 percent cut in personnel costs. The definitional purpose of ER will then have been circumvented; efficiencies are then no more than just another budget reduction.

If ER performance work statements are to be meaningful, productivity measurement must truly reflect the performance of the activity examined. Chapter IV provides one suggested

approach to a performance indicator for health care delivery that may resolve some of the issues that have been associated with past measures. The measure can be adapted to any level of the health services system and provides a methodology that respects differences of population, patient, health care services and activities, and product(s). The CA and ER programs must rely on valid and useful performance indicators as an essential part of the PWS.

Finally, future approaches for productivity measurement and productivity improvement for the Department of Defense Health Services System must be interdependent and dynamic elements of the overall health care delivery management process. These sub-processes must complement structural, policy, and resource allocation decision making at all levels of the organization. Further, the reward and punishment tools of management control should be able to rely on productivity measurement methodologies to identify those areas in need of analysis and productivity improvement efforts. Although acceptable methodologies for productivity measurement are now within reach, analytical processes suitable for quantitative understanding of health care delivery and the development of standards for performance are only in embryonic agreement with reality.

B. REMARKS

If the health services system must justify its requests for money and manpower partially on the basis of productivity

measurement, a new and better measure must be developed and implemented that will avoid the pitfalls of the CWU and HCU. The thesis offers one proposal for consideration that should result in relative facility homogeneity and adjust for patient heterogeneity sufficient to the needs of management for measurement of productivity. If the results of measurement are to be useful, the decision maker must be able to directly relate what the measure indicates to the decision process. The proposed measure offers promise in this regard; because it permits comparison of expected to actual utilization patterns across comparable levels of activity and over time.

The health services system of DOD should recognize the positive aspects of ER at the top echelons and coordinate efforts. Strong central support is necessary or this program will face tokenism and resistance from lower level entities.

Efficiency Review programs are currently tied to the manpower planning and manpower standards' bodies of the respective services and are functionally oriented toward personnel savings. Although personnel costs are an important ingredient of any cost picture for an organization, ER should take on a more holistic design and should examine all aspects of health services for productivity and efficiency improvement. The military health services system should recognize the need for strong centralization of effort and develop a program

that is unique to the peculiarities of health care delivery. Strong centralization, with consistent policies and strategies designed to permit innovation, is necessary for the ultimate success of the ER approach in the complex structure of DOD health services delivery.

The ER program should be carefully integrated into similar efforts going on in other areas of management improvement such as the CA process, manpower standards development, civil service job reclassification and audit, and internal review. Efficiency Review can take advantage of these efforts and avoid confrontations and disruption if all such efforts are coordinated.

Efficiency Review planning should employ static evaluative techniques of ER, but should be developed as a dynamic process with permanently assigned and trained personnel on the job. It is easier to make medical personnel efficiency experts than to train efficiency experts in medicine.

Since Efficiency Review could take on some of the more rigid and costly aspects of the CA process, it is better to put Efficiency Review to work directly on those areas where it will be most effective. The depth of analysis and time devoted to these efforts should be centered on areas that are quantitatively measurable. But other, more effective, mechanisms for health care delivery evaluation are needed to achieve productivity improvement. The approach can be similar to the CA process in that it should be more comprehensive;

more organizationally oriented; more cost comparative; and address the illusive problems of health services system over the long term. The incentives for cost containment must be strong and effective, but awareness of quality must weight all actions taken for the sake of cost control.

Currently, there is little incentive for military medical facilities to operate more efficiently since all funding is internally justified and no profit motivation exists. The current funding scheme encourages the institution to spend because there is little reason to save. It is recommended that further study be undertaken to assess the feasibility of changing the funding and budgetary system to some approximation of the civilian prospective payment scheme. The Navy Industrial Fund has features that promise opportunity for adaptation to this approach. For example, data services are now provided on a "reasonable payment for services rendered" financial structuring placing management at risk for inefficiency; offering the potential for implementation of a "quasi-profit" incentive for rewarding institutions that demonstrate cost-reducing behavior.

Although the physician is in the minority, with respect to the overall large number of people employed by the health services system, the practitioner directly or indirectly is responsible for the majority of the system's health care delivery controllable expenditures. This, of course, is because physicians essentially control the entire care process.

Modification of physician behavior holds promise for significant savings if the incentives necessary to instill efficient behavior are identifiable and implemented. One potential incentive usually effective elsewhere is to reward or punish behavior as needed through salary. There are many complexities and difficulties associated with service needs and other considerations that make this a problem for implementation for military physicians. However, bonus schemes and fines are potential tools that can be associated with behavior and avoid some of these difficulties.

Physicians made aware of what patient care actually costs for their patients are much easier to influence toward more efficient behavior. Educational programs that provide some understanding of costs for ancillary services can reduce utilization of unnecessary resources. Full-cost accounting can demonstrate individual case resource and service costs so that physicians can be compared; individually or as group members.

Beneficiaries or consumers are usually unaware of the cost of health care provided to them because of the "free" nature of services rendered. Schemes that propose control of supposed overutilization are unpopular and may not achieve their purpose. Consumers should, however, be made more aware of the high cost of medical care. A full-cost accounting system can provide information directly to the patient or sponsor detailing costs that were related to respective care

received. This can be supplemented with educational programs which emphasize concerns about the costs and alternatives of health care utilization. It is also possible to develop incentives that reward efficient utilization such as annual cash bonuses for those who seek care at a rate less than expected. It is recommended that further study of cost awareness approaches be conducted to estimate potential for cost containment.

Recognition of activity success at productivity improvement and cost containment can be acknowledged through various approaches. High level awards, publicity, reprogramming of some savings achieved back to the activities, cash awards, etc., are just some of the other obvious positive incentives that can induce motivation for efficient and cost saving behavior.

APPENDIX A

The military health services system developed the Uniform Chart of Accounts (UCA) as a means to collect and report on costs and workload for military medical treatment facilities.

A. PURPOSE

The implementing DOD instruction stated that the purpose of the UCA "is to provide consistent principles, standards, policies, definitions, and requirements for expense and performance accounting and reporting by DOD fixed military medical facilities" [Ref. 25]. Other purposes included the measurement of productivity; the development of performance and cost standards for "cost effectiveness" and the development of informational tools that could focus attention on inefficiency and poor management. The UCA represents the culminated efforts of the military health services system to set common, comparable, standards for the measurement of performance and the reporting of costs.

Although the UCA provides necessary information to enable operational managers to design, implement, and utilize operational control systems, the more important scope of intent was the improvement of information permitting efficient and effective management accomplishment of strategic planning

for the military health services system. The UCA provides for quantification of efficiency with a cost per unit of output. The UCA attempts to minimize the subjective or nonquantifiable aspects of objective accomplishment recognition and the evaluation of output in terms of effectiveness. The UCA can be considered an imposed, aggregating cost accounting system designed to enhance existing reporting and analysis subsystems of the military health services system's existing accumulative management control processes; an attempted blending of the differences in the military missions, system sizes, hospital sizes, fiscal and financial structures, reporting authorities, reporting requirements, and other distinguishing factors.

In the MHSS, use of the UCA primarily would be restricted to performance valuation, productivity measurement and resource allocation efficiency evaluation, since profit maximization is not an objective. The standardization of cost accounting and reporting by means of the UCA was targeted toward six other objectives:

1. A uniform MHSS chart of accounts,
2. A commonality of definition for workload, work centers, and respective cost accounts,
3. A broader, more specific, data base for use in management report generation,
4. A way to apply performance measurement for internal and external comparisons, inter- and intra-service comparisons, and civilian sector comparisons,
5. A means of efficiency and cost measurement, and
6. A process of overhead and ancillary service expense allocation procedures.

The UCA and implementing instructions stress that beyond required reporting structure, the UCA process permitted the local medical treatment facility considerable freedom to design supportive local management decision, management control, and operative control systems for internal purposes.

As a cost accounting system, the UCA is designed to step-down overall cost assignments into final, commonly defined, operating expense accounts. One feature of the system permits identification of nondirect patient care costs associated with nonmission functions of the respective activity.

For purposes of fulfilling report requirements of OASDHA, the UCA provides a broad data base of information for use in the preparation of the Medical Expense and Performance Report (MEPR).

This five part report is forwarded to OASDHA every three months. It provides activity cost and performance data together with a narrative summary where comments, recommendations, evaluations, and planning summarizations may be included.

The UCA's hierachy of functional accounts begins with a grouping of six categories reflecting expenses and corresponding workload data:

A--Inpatient Care

B--Ambulatory Care

C--Dental Care

D--Ancillary Services

E--Support Services

F--Special Programs

Each functional account is divided into summary accounts that are further broken down into subaccounts. All expenses are ultimately aggregated into four final operating expense accounts: inpatient care, ambulatory care, dental care, and special programs. An example for a functional category of inpatient care is:

Functional Category	Summary Account	Work Center Account	UCA Code
Inpatient Care			a
Medical Care		aa	
Internal Medicine	aaa		
Dermatology	aad		
Surgical Care		ab	

The first level code represents the functional category, the second level indicates the summary account, and third level alpha codes define the subaccounts. Fourth level codes are permitted for activities to reflect internal special definitional purposes and, as such, are not considered as standard by the UCA. These codes are commonly used to designate remote facilities responsible to the primary reporting medical facility. Two of the functional categories, ancillary services (D) and support services (E) are considered intermediate operating expense accounts that are ultimately assigned to final operating expense accounts (inpatient care (A), ambulatory care (B), dental care (C), and special programs

(F)). Third level "Z" codes identify a clinic or activity that does not fit the standards for UCA subaccounts. These codes are considered interim, or temporary, and final identification awaits new, permanent UCA codes. "Z" coding is identified as "not elsewhere classified." When necessary, shared costing is permitted in cost pool accounts designated by an "X" at the third level. The costs are then distributed among the respective subaccounts in a mutually acceptable manner. A filler cose, "Y", is used at the third level to avoid a blank space in the identification of fourth level entities (i.e., EEYA).

Each of the functional categories has cost and workload collection (input and output) to produce some cost per unit of workload. Expenses and measures of output are provided for each account. For example, support services (UCA-E) output is represented by measures such as square footage or pro rata of services, but there is no efficiency measure since these accounts are intermediary in nature. Efficiency for inpatient accounts (UCA-A) is measured by dividing the total account expenses by the number of occupied bed days per interval credited to each account. Visits are applied to ambulatory care accounts (UCA-B). Dental care accounts (UCA-C) input is measured in terms of weighted dental procedures based upon the mix of time and resources devoted to procedure performance. Ancillary care accounts (UCA-D) inputs are identified by departmental units such as prescriptions,

hours of service, etc. Special programs (UCA-F) include military unique accounts that are deducted from the patient related care system's overall expenses to provide a better understanding of the facility's direct patient care costs.

General ward expenses are an example of an intermediary account process that is stepdown sequenced to professional services' final operating accounts on the basis of a two-way daily tally of ward occupied bed days of inpatients for each care service and the ward (reported monthly). Ward UCA codes do not get measured in terms of costs per workload unit since they are considered "pooled accounts."

B. UCA DATA BASE

All financial and workload summary data goes into the facility UCA data base on a quarterly basis. This data base is structured as follows:

> The UCA code dictionary or Account Subset Definition (ASD) associates a full and valid listing of facility UCA codes with the correct identification of workload distribution on the workload data sheet or SAS. This permits control of expense allocation. The workload data base or SAS groups records in sets, identifiable by number, enabling assignment of costs. The SAS also measures the work center (by UCA code) services rendered of intermediate accounts as applied to final account work centers. The Direct Expense Schedule (DES) or expense data accumulates direct expense data for each UCA code. The SAS specifies and directs the stepdown of intermediate account expenses to the final accounts. This stepdown process is completed in three phases: direct expenses are allocated to work centers via the DES; the SAS redistributes the expenses to work centers; and, computation (yearly or quarterly) results are summarized.

C. REPORTS

The Computation Summary provides the functional account (by UCA) and its categorical summary. This accumulates total accumulated direct expenses; total support services expenses acquired; total ancillary services expenses acquired; and, total costs from pooled accounts. Final total expenses (direct expenses before stepdown = total of final expenses) aggregates this information.

The Detailed Unit Cost Report details the total expenses, output measures, and a cost per unit of output for use in analysis at the local level for management control purposes.

Both reports are useful for further analysis to reflect departmental, activity or facility performance. Examination of deviant unit costs can be examined for true significant changes in workload or expenses. False deviations can be traced to assignment of erroneous expense amounts under stepdown or erroneous workload data entry. The UCA provides improved capability to make comparisons (intra- and inter-service and civilian source) of uniform expense and workload data, but doesn't offer utilization guidance. The UCA does enhance cost awareness; it does provide more accurate and complete expense information; it does assign expense responsibility to the appropriate work centers; it does provide for categorization of management cost effectiveness; it does facilitate the interpretation of cost consideration in the decision making process; and, finally, it provides for a more meaningful work count.

The UCA is not an expense and workload collection system, but many features of the UCA are relatable to a cost accounting system. Further, the UCA is intended to be complementary to military accounting; only expenses are collected and reported, other characteristics of a cost accounting system are not present. Many UCA accounts do not correspond to specific organizational units but to entire programs. A service may consume or utilize resources from ancillary or support services, but the responsibility center has no direct control over the respective service provisional costs. Finally, cost objectives are not designed to support activity management needs.

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